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ABSTRACT

Volume Two of a report by the Arizona Board of Regents' independent citizen commission to examine the performance of the state's three public universities presents 26 working papers in four sections. Section One, Research and Graduate Education/Universities: A State Resource, offers five papers, including: "University Research and Economic Development in Arizona Today: A Working Paper: (M. Fisher); "Technology Transfer and Economic Development in Arizona" (J. Brophy); and "The Quality of Graduate Education at Arizona's Universities" (M. Fisher). Section Two, Mission Development and Strategic Planning, has 10 papers, including: "Arizona Environmental Scan Study" (J. Bartram and M. Gebel); "Some Thoughts About Approaching the Future of Arizona" (R. Caldwell); and "Enrollment at Arizona Universities: Forecasts to the Year 2000" (R. Caldwell and K. Brown). Section Three, Management Efficiency and Accountability, offers nine papers, including the following: "The Governance and Decision Making Processes of the Arizona Board of Regents and Universities" (J. Schneider and E. Johnson); "Survey of Administrative Service Operations at the University of Arizona, Arizona State University and Northern Arizona University" (G. Davis); and "Advanced Placement: Increasing Efficiency in High School-University Articulation" (R. MacVicar). Section Four, funding and resource utilization, offers the following three papers: "An Overview of the State of Arizona, Arizona Board of Regents and University State Operating Budget Request Processes Including a 25 Year State Funding, Productivity and Performance Output History of University of Arizona Main Campus, Arizona State University Main Campus and Northern Arizona University" (A. Carroll); "The Role of Private Fund Raising in Enhancing the Excellence and Competitiveness of Arizona's Universities" (E. Johnson); and "Recruitment and Retention of Faculty: An Imperiled National Resource" (G. Davis). (SM)

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THE FINAL REPORT AND WORKING PAPERS OF THE ARIZONA BOARD OF REGENTS' TASK FORCE ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS

Volume Two

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TABLE OF CONTENTS

Volume One

INTRODUCTION

FINAL REPORT 1

SUMMARY OF RECOMMENDATIONS 58

ETHNIC MINORITY STUDENTS

STUDENT ACCESS TO THE ARIZONA UNIVERSITY SYSTEM WITH STUDIES OF RETENTION AND PERSISTENCE: A RESEARCH GUIDE 72
AUGUSTUS S. COTERA

COMMUNITY COLLEGE-UNIVERSITY ARTICULATION IN ARIZONA 76
ROBERT MACVICAR

OPPORTUNITIES FOR TELECOMMUNICATION FOR UNIVERSITY OUTREACH IN ARIZONA 89
ROBERT MACVICAR

BARRIERS TO MINORITY ACCESS AND PERSISTENCE IN ARIZONA'S UNIVERSITIES: PERCEPTIONS OF STUDENTS, FACULTY, STAFF AND ADMINISTRATORS 101
JOHN J. WOOD

UNIVERSITY SERVICE TO RURAL ARIZONA 115
ROBERT MACVICAR

SURVEY OF FACTORS OF STUDENT ACCESS AND PERSISTENCE IN THE ARIZONA UNIVERSITIES 126
AUGUSTUS S. COTERA

ACADEMIC PREPARATION OF HIGH SCHOOL STUDENTS IN ARIZONA MEAN: NATIONAL CURVE EQUIVALENT SCORES (NCE) STANFORD ACHIEVEMENT TEST (SAT) 1986-1987 255
AUGUSTUS S. COTERA

MINORITY ACCESS AND PERSISTENCE STUDY: A WORKING BIBLIOGRAPHY WITH ANNOTATIONS 300
VINETTE COWART, JOHN J. WOOD AND AUGUSTUS S. COTERA

PROGRESS REPORT: ACCESS AND PERSISTENCE OF MINORITY STUDENTS IN THE ARIZONA UNIVERSITIES 343
AUGUSTUS S. COTERA, VINETTE COWART, JOHN J. WOOD AND NORMANDO DEHALLE

STUDENT FINANCIAL ASSISTANCE IN THE ARIZONA PUBLIC UNIVERSITIES 383
VINETTE COWART

MINORITY EDUCATION IN ARIZONA'S UNIVERSITIES 403
JOHN J. WOOD

QUALITY OF UNDERGRADUATE EDUCATION

EVALUATION AND ASSESSMENT: A LITERATURE REVIEW (SUMMARY) 489
MARY J. TALBOTT AND KATHLEEN CHURCH

ASSESSMENT AND OUTCOMES MEASUREMENT: STATEWIDE AND SYSTEMWIDE INITIATIVES 500
MARY J. TALBOTT AND KATHLEEN CHURCH

TEACHER SUPPLY AND DEMAND IN THE 1990'S AND PROFESSIONAL EDUCATION OF TEACHERS IN ARIZONA 521
ESTHER SHERBERG

EXECUTIVE SUMMARIES OF REPORTS AND BOOKS ON HIGHER EDUCATION 546
MARY J. TALBOTT

UNDERGRADUATE LITERACY PROGRAMS AT ARIZONA UNIVERSITIES 603
KATHLEEN CHURCH

AN EVALUATION OF THE DECENNIAL REVIEW PROCESS 613
ROBERT BARAK

UNDERGRADUATE ASSESSMENT EFFORTS IN ARIZONA'S UNIVERSITIES: A STATUS REPORT TO THE TASK FORCE ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS 619
PETER T. EWELL

REPORT ON HONORS PROGRAMS AT THE UNIVERSITY OF ARIZONA, ARIZONA STATE UNIVERSITY AND NORTHERN ARIZONA UNIVERSITY 630
C. GREY AUSTIN

ADMISSION REQUIREMENTS AT ARIZONA PUBLIC UNIVERSITIES 660
KATHLEEN CHURCH

ROLE OF TEMPORARY FACULTY IN UNDERGRADUATE EDUCATION AT THE THREE ARIZONA UNIVERSITIES 673
GEORGE H. DAVIS, MARY J. TALBOTT AND KRISTIN L. CETONE

TEMPORARY FACULTY IN THE ENGLISH AND MATHEMATICS DEPARTMENTS AT THE THREE ARIZONA UNIVERSITIES 680
MARY J. TALBOTT, GEORGE H. DAVIS AND KRISTIN L. CETONE

BENEFITS AND COSTS OF ASSESSMENT IN HIGHER EDUCATION: A FRAMEWORK FOR POLICY CHOICE AND COMPARISON 697
PETER T. EWELL

A SURVEY OF ALUMNI, CLASS OF 1981, ARIZONA'S UNIVERSITIES OUTCOMES AND OPINIONS 729
KATHLEEN CHURCH

A SURVEY OF UNDERGRADUATE STUDENT OPINIONS 750
KATHLEEN CHURCH

ATTRACTION AND RETENTION OF CLASSIFIED STAFF: THE SILENT PARTNERS 780
ESTHER SHERBERG AND KRISTIN L. CETONE

ARIZONA: THE STATE & ITS EDUCATIONAL SYSTEM 786
HAROLD HODGKINSON

VOLUME TWO

RESEARCH AND GRADUATE EDUCATION/UNIVERSITIES - A STATE RESOURCE

UNIVERSITY RESEARCH AND ECONOMIC DEVELOPMENT IN ARIZONA TODAY: A WORKING PAPER 804
MARVIN FISHER

THE STATUS OF RESEARCH ACTIVITY AT ARIZONA'S UNIVERSITIES: A WORKING PAPER 818
MARVIN FISHER

TECHNOLOGY TRANSFER AND ECONOMIC DEVELOPMENT IN ARIZONA 844
JAMES BROPHY

HOW SHOULD UNIVERSITIES RESPOND TO THE IMPERATIVE, "PROFESSORS SHOULD SPEND MORE TIME TEACHING AND LESS TIME ON RESEARCH!" 849
GEORGE H. DAVIS

THE QUALITY OF GRADUATE EDUCATION AT ARIZONA'S UNIVERSITIES 859
MARVIN FISHER

MISSION DEVELOPMENT AND STRATEGIC PLANNING

THE MISSIONS AND STRATEGIC PLANNING OF ARIZONA'S UNIVERSITIES 878
ROBERT MACVICAR

ARIZONA ENVIRONMENTAL SCAN STUDY 879
JACK BARTRAM AND MELINDA GEBEL

SOME THOUGHTS ABOUT APPROACHING THE FUTURE OF ARIZONA 894
ROGER L. CALDWELL

FORESIGHT: DEFINITION AND NEED FOR ARIZONA UNIVERSITIES 899
ROGER L. CALDWELL

ARIZONA'S UNIVERSITIES IN TRANSITION 908
ROGER L. CALDWELL

ARIZONA'S SYSTEM OF HIGHER EDUCATION IN COMPARISON TO THOSE OF OTHER STATES 934
GEORGE H. DAVIS

FUTURE CHANGES: IMPLICATIONS FOR ARIZONA UNIVERSITIES PART I: SUMMARY AND RECOMMENDATIONS, PART II: BACKGROUND STUDIES 951
ROGER L. CALDWELL

STRATEGIC PLANNING AND THE ARIZONA UNIVERSITIES 1012
ROGER L. CALDWELL

ARIZONA UNIVERSITIES PROGRAM CHANGES NINE YEAR SUMMARY: FY 1981 - FY 1989 1048
ROGER L. CALDWELL

ENROLLMENT AT ARIZONA UNIVERSITIES: FORECASTS TO THE YEAR 2000 1082
ROGER L. CALDWELL AND KENNETH BROWN

MANAGEMENT EFFICIENCY AND ACCOUNTABILITY

THE GOVERNANCE AND DECISION MAKING PROCESSES OF THE ARIZONA BOARD OF REGENTS AND UNIVERSITIES 1129
JACQUELINE SCHNEIDER AND EDWARD JOHNSON

A REVIEW OF THE PURPOSE AND SCOPE STATEMENTS OF THE TASK FORCE ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS OF THE ARIZONA BOARD OF REGENTS 1136
COOPERS & LYBRAND

A REVIEW OF THE ORGANIZATION, FUNDING PROCESS, AND SELECTED ADMINISTRATIVE SYSTEMS OF THE ARIZONA UNIVERSITIES AND THE ARIZONA BOARD OF REGENTS 1190
COOPERS & LYBRAND

SURVEY OF ADMINISTRATIVE SERVICE OPERATIONS AT THE UNIVERSITY OF ARIZONA, ARIZONA STATE UNIVERSITY AND NORTHERN ARIZONA UNIVERSITY 1275
GEORGE H. DAVIS

STATUTORY AND REGULATORY BARRIERS TO GREATER EFFICIENCIES IN THE ARIZONA UNIVERSITY SYSTEM 1289
EDWARD JOHNSON

EFFICIENCY OF SUPPORT SERVICES WITHIN THE ARIZONA UNIVERSITIES 1302
GEORGE H. DAVIS

PROGRAM DUPLICATION IN ARIZONA UNIVERSITIES 1312
ROBERT MACVICAR

ADVANCED PLACEMENT: INCREASING EFFICIENCY IN HIGH SCHOOL-UNIVERSITY ARTICULATION 1323
ROBERT MACVICAR

ACADEMIC DEGREE PROGRAM DUPLICATION 1328
COUNCIL OF PRESIDENTS

FUNDING AND RESOURCE UTILIZATION

AN OVERVIEW OF THE STATE OF ARIZONA, ARIZONA BOARD OF REGENTS AND UNIVERSITY STATE OPERATING BUDGET REQUEST PROCESSES INCLUDING A 25 YEAR STATE FUNDING, PRODUCTIVITY AND PERFORMANCE OUTPUT HISTORY OF UNIVERSITY OF ARIZONA MAIN CAMPUS, ARIZONA STATE UNIVERSITY MAIN CAMPUS AND NORTHERN ARIZONA UNIVERSITY 1332
ALAN W. CARROLL

THE ROLE OF PRIVATE FUND RAISING IN ENHANCING THE EXCELLENCE AND COMPETITIVENESS OF ARIZONA'S UNIVERSITIES 1360
EDWARD JOHNSON

RECRUITMENT AND RETENTION OF FACULTY, "AN IMPERILED NATIONAL RESOURCE" 1386
GEORGE H. DAVIS

RESEARCH AND GRADUATE EDUCATION/ UNIVERSITIES - A STATE RESOURCE

UNIVERSITY RESEARCH AND ECONOMIC DEVELOPMENT IN ARIZONA TODAY: A WORKING PAPER

MARVIN FISHER

When asked by a skeptic "What is the use of scientific research?" Benjamin Franklin, founder of what came to be the University of Pennsylvania, answered with his own question: "Of what use is a baby?" Franklin was quite willing to support research even when it was not immediately applicable to need, because he viewed it as an investment in the future. But we also know from the availability in the 18th century of such still used items as the lightning rod, bifocal glasses, and the Franklin stove that Dr. Franklin had a keen eye for technological applications and adaptations. He was in a real sense the father of technology transfer in America and viewed the exercise of scientific curiosity as a form of public service or community concern, ultimately as beneficial as his creation of a postal service, a fire department, a public library, or a system of municipal lighting in Philadelphia. Economic development may have been secondary to a materially improved standard of living, but it was already an apparent concern.

By the middle of the 19th century, the excellence and competitiveness of American attainment in manufacturing and management had become painfully apparent to visitors from abroad. One conservative Englishman summed up his impression of the U.S. this way: "Thus in energy, enterprise, perseverance, sagacity, activity and varied resources... which contribute to produce what is technically called material civilization,... there is no disputing the superiority of the Americans to ourselves. Wherever they have a fair play, whether in the management of a hotel, of a ship, or a prison, or a factory, there is no competing with them" (Godley, I, IX-X). On this issue even his most determined liberal opponent had to agree when confronted by "gigantic facts proving the indisputable superiority of that country in all that constitutes the power, wealth and real greatness of a people" (Cobden, 26).

In addition to management efficiency, mid-19th century visitors praised design efficiency in American locomotives, sailing ships and steam navigation, increasing use of interchangeable parts and mass production procedures, conveyor belts in the ceilings of tobacco curing factories, and a disassembly line in a Cincinnati slaughterhouse. Some of the highest praise for efficiency applied to common agricultural tools--forks, rakes, shovels and the like, which "display a lightness combined with

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Dr. Marvin Fisher, a specialist in American literature and cultural history, has been a member of ASU's English Department for 30 years, including six as department head. He has taught at three other American universities and three foreign ones. Among his several books is one on the beginnings of American industrialization and its impact on the economy, society, and the imagination.

strength, a beauty of proportion and high finish, which is not seen even in our most improved ones and is far superior indeed to those commonly used here. Their best five-pronged forks are cut out of a single piece of steel, and ... ring like a tuning-fork: lightness and handiness are particularly attended to in these; whereas here [England] it seems to be forgotten that half a pound of superfluous weight lifted only each quarter of a minute makes a difference of at least half a ton in the working day, and lessens...the quantity of work the laborer can perform in the day. It is to be feared, that unless our manufacturers vie with these models they will lose the colonial and foreign markets" (Eddy, 120-21).

It probably was not a historian who first said "What comes around, goes around," but a historian could not find a better phrase to suggest that the U.S. now stands where Great Britain did in the mid-19th century. Japan and West Germany compete effectively in electronics, automobiles, cameras and scientific optics. The VCR was invented in the U.S. 30 years ago, but not one is manufactured here today. Manufacturers of clothing and shoes have either moved to third world countries or draw third world workers to the U.S. Watches at the high and low end of the scale come from elsewhere. Our budget and balance of payments rise like twin towers (or is it twin shafts?). The American computer industry is still running strong, but even here the competition is formidable. Our new tax laws lessen the advantage of deductions for industrial research and development. Japan, with half the population, graduates more engineers than the U.S. Twenty years ago the number of engineers per capita in the U.S. was higher than that of any other country, but as our decline began in the late 1960's, the proportion of engineers rose steadily in Japan and West Germany. The National Science Foundation projects an even more appalling statistic: even if the U.S. could attract students to science and engineering programs at the 1983 rate, the number of science and engineering graduates would be almost 700,000 fewer over the next 20 years than in the past 20 years. (America's Competitive Crisis, 17-18). Mathematics graduates chart a similar trajectory, and at present more doctoral degrees in math go to foreign students in American universities than to American students. Unfortunately, less is not more in this instance; the drop in quantity does not produce a rise in quality; and it is an understatement to suggest that the nation is losing its competitive edge in the crucial areas of science and technology.

RESEARCH COSTS AND BENEFITS

As the incentives for industrial R & D diminish, the potential role of university conducted research is enlarged. At the nation's premier universities the total of research expenditures from federal, corporate, and where applicable, from state sources exceeds the cost of government in some of the lesser members of the United Nations. For a university intent on recruiting a top rung researcher in a hot science field, the salary is insignificant in comparison to laboratory and equipment costs. In the case of state universities, the increasing emphasis on and cost of research activity constitute a target for the criticism of economy-minded legislators and concerned members of the general public. Universities have been pressed to show that heightened research activity does not draw down the level of instructional quality and that direct economic benefits accrue to community and state from the investment in research.

Many of Arizona's ablest high school graduates choose to continue their education elsewhere. The most gifted overwhelmingly choose universities with strong reputations for research rather than small colleges which emphasize teaching. If questioned about their choices, however, they are very likely to answer in terms stressing their expectations of the quality of education, ignoring the institution's reputation for research excellence. Published rankings of our universities, whether based on federal grants or reputational impressions, are more openly based on quality and quantity of research activity.

The extent to which a university engages in research is widely recognized as an index of its excellence. The record of its ability to foster the transfer of discovery, improved process, or new technology into a more utilitarian sector is one measure of its efficiency. The effect of that transfer on the economy of locality and state adds to the competitiveness of the institution and the state. Viewed as a whole, the movement of university sponsored or affiliated research into the productive sector combines the delight of discovery with the prospective profitability of industrial and commercial application. The potential impact on economic development, from the creation of new jobs to a broader tax base, can effectively unite research and public service and fulfill two traditional aspects of a university's mission in a dramatic new way. The dollar impact of a major university research program on the local economy is difficult to calculate, but an estimate offered by Dr. Laurel Wilkening, UA Vice President for Research, and based on studies of the UA Division of Economic and Business Research, suggests that a $100,000,000 research budget could have an economic impact of $228,000,000 on the local community.

The role of the university as an agency abetting economic development through discovery and promotion of new products and processes has an impressive history in the United States. The Morrill Act in 1862 established land grant colleges to spur economic development in agriculture, commerce and industry. The Hatch Act of 1887 furthered these purposes by providing outside funding for agricultural research and services. Under the Hatch Act, UA qualified for its first federal grant of $10,000 in 1890, followed by an additional $30,000 commitment under a second Morrill Act later in 1890. Many of these land grant institutions have become the major public research universities of today. Their potential role in fostering economic development is even greater, but the means of doing so are more complex than the establishment of agricultural or engineering experiment centers. Contemporary efforts to strengthen the higher education-economic development connection increasingly depend on innovative linkages of the public and private sectors--arrangements involving not only representatives of universities and industry but also agents and agencies of city and state government and the services of highly specialized for-profit or non-profit research development and marketing corporations.

ARIZONA'S CHANGING RESEARCH CLIMATE

The day of Arizona's reliance on copper, cotton, citrus and cattle has passed. Climate and construction and more recently components and computers have superseded the first combination, and the new combination is transforming Arizona's major population centers into examples of post-industrial society. The most important factor in this transformation and in Arizona's continuing economic health has been the growth of manufacturing, not the relocation of existing industry but the development of new firms and their subsequent expansion. Whereas mining and heavy industry (smokestack industries) required access to power and rail lines, a supply of relatively unskilled labor, and sources of natural or processed resources, today's high technology industries do not have to locate on navigable rivers or near rail lines. They are more concerned with locating near a major research university that can supply the specialized knowledge, state-of-the-art computers, and access to relevant graduate programs for continuing professional development. These universities are the hub of a knowledge-intensive society and the most important resources for attracting a future-oriented, "sunrise" industry or industrial consortium.

The experience of many states demonstrates that regional economic growth can be significantly stimulated by the technological offshoots of academic research, but in Arizona state investment in economic development has lagged behind the leaders. Silicon Valley, Route 128, and the Research Triangle are metaphors of economic geography, easily grasped by informed readers. For universities these localities constitute patterns for potentially beneficial cooperation with firms on the cutting edge of contemporary technology and opportunities for encouraging faculty entrepreneurship. Universities can use income from licensing costs to defray the fearfully high start-up costs for active, new researchers. Graduate students can gain practical experience in situations that universities cannot duplicate and with equipment that few universities can afford.

With its involvement in applied research dating back to the Hatch Act and the second Morrill Act in the late 19th century, UA leads the Arizona universities in creating the mechanisms and atmosphere conducive to technology transfer and economic development. These activities are centered in the Office of Technology Transfer (OTT) and the Arizona Technology Development Corporation (ATDC).

With greater latitude resulting from recent amending of Arizona's conflict-of-interest law, and a new patents policy, Arizona faculty members are encouraged to engage more directly in entrepreneurial activities based on their research. The Arizona Technology Development Corporation, organized "as a for-profit arm of the University of Arizona Foundation," exists to enable faculty researchers to benefit more directly from their efforts and to speed new technology into commercial application. According to a recent but undated UA publication entitled The Value of Research at the University of Arizona, the services of ATDC "could include handling patenting matters, generating venture capital, creating new companies, or forming joint ventures or licensing arrangements with existing companies." (p.4). ATDC, with its private corporate status and indirect link to the UA, has given rise to a more recent entity funded by the UA and called the Office of Technology Transfer. Its functions would precede those of ATDC, giving ATDC the more specific responsibility of developing viable commercial enterprises.

The University has also entered into a cooperative program for commercial transfer of new inventions, new plant species, and related cultivars. The new patent management/technology transfer partner is Research Corporation Technologies (RCT), a subordinate spin-off of the 76 year old Research Corporation. Founded for the purpose of funding scientifically significant research, the Research Corporation is based in Tucson, maintains international operations, and is directed by a former UA president and a former vice president.

RCT thus provides OTT with many strengths and capabilities for licensing invention disclosures that cannot be matched by in-house patent management agencies. Nevertheless, ATDC will remain an alternative means of commercializing technological innovation through nurturing new companies. To date, six companies have been launched, and ATDC holds an equity position in each on behalf of the University. ATDC supplied early aid and guidance through funding and planning and continuing aid and advice through placing an ATDC officer on each company board.

A look at the economic impact of one conspicuously successful UA unit devoted to both teaching and research in optical sciences provides some illuminating results. A national leader in the field, the Optical Sciences Center currently attracts contracts and grants totaling nearly $10,000,000 a year. Since its inception in 1968, OSC has received almost $10,000,000 in state funds but attracted nearly $90,000,000 in outside funds. During the ten-year period from 1973 to 1983 state funding amounted to $4,317,000, but the total cash flow generated by the Center was more than ten times the state funding. If 50% of the total cash flow went for salaries and wages and 25% of the remainder went for goods and services within the state, the state investment of $4.3 million produced a $27 million infusion into the state economy.

Arizona State University, despite its location in the state's population center, has had a later start in pursuit of economic development. The Phoenix Economic Development Corporation seems to have been unaware of the potential role that ASU could play in research and economic development until the last-minute SEMATECH proposal was put together. It is evident that ASU's College of Engineering began a major transformation from a "nuts and bolts" operation to a stage of major aspiration and achievement with its Engineering Excellence Program in 1979, and it has taken time for full awareness to permeate community consciousness.

The Phoenix-based Arizona Focus on Technology and the Arizona Innovation Network have prepared detailed recommendations constituting "a legislative agenda on economic development," calling for a variety of State-University-Industry-Business linkages, and discussing possible sources of venture capital (including the possibility of tapping into state pension and retirement funds), but these are not yet organizations with established legislative influence. Arizona State University has created the Arizona State Research Institute, a non-profit corporation, in pursuit of many of the same goals as the ATDC, and shortly thereafter entered its first major technology transfer agreement with a private firm interested in marketing a blood-sugar sensor to be used with an insulin pump. Although both of these technology transfer agencies have been incorporated with the state, only ATDC has thus far achieved a memorandum of understanding with the Board of Regents regarding its precise relationship to the university.

Just as the contemporary research university, despite its frequently urban location, has its ideological roots in the stated mission of the land grant institutions, the language used to convey its new role in economic development draws heavily on the agrarian experience of the past. One university administrator in a midwestern state made little headway with a legislature that was skeptical about the time and money going into research and fearful that teaching was being neglected--until he pointed out that research was the fertilizer that made economic development grow. Through the metaphors of the new alliance of business, industry, and academia, the myths that invested our past assume a new currency and spokesmen who never raised a crop explain the need for seed money and the role of incubators in producing home-grown technology. Logic tells us that Ben Franklin could not possibly have foreseen this when he implied that we needed to nurture science and technology just as we nurtured an infant, that each was an investment in the future. But intuition links Franklin's practical idealism and the contemporary efforts of Pennsylvania's Ben Franklin Partnership, one of the nation's most successful providers of seed money through its four advanced technology centers, which also serve as incubation facilities where research grows into new technology. The consortium of business, industry, labor, local economic districts and academic institutions constitutes the largest state technology program in the country, and its record of successful technology development and transfer makes it an enviable model for a host of would-be emulators.

When the first ASU Farm gave way to a new president's residence and moved its operations beyond the city limits, only to find the city surrounding the new location in just 20 years, it again gave way to social change and began metamorphosis into the ASU Research Park. Integrated with the first phase of ASU's Engineering Excellence Program (1979-1984) the Research Park was planned with several functions and goals: providing incubator facilities, attracting industrial affiliates and encouraging cooperative research, speeding technology transfer, and creating new jobs and an increased tax base. The completion of the five-story, 120,000 square foot Engineering Research Center in 1984 and the 1987 commitment of ICI Americas for major research facilities should enhance the attractiveness of the Research Park for future tenants. The establishment of a Center for Professional Development in Engineering in 1981 emphasized human resource development through the creation of new credit and non-credit courses for local engineers and computer scientists. It could also help persuade new industry to locate where their technical employees could upgrade their skills and develop new competencies. And in dramatic contrast to the threat of a national decline in engineering enrollment, ASU's enrollment in engineering has increased 100% during the past six years. Research awards have shown an even greater rise: from $1.64 million in 1980 to more than $14 million in 1986. The first phase seems to have earned good grades for attaining most of its objectives.

Phase II of the Engineering Excellence Program (1985-1990) adds the new area of Telecommunications to the earlier focus on Solid State Electronics, Computer Science, Computer Aided Processes, Energy Systems, Transportation Systems and Thermosciences. In pursuit of organized research in these targeted research areas, Phase II illustrates an economic consequence of developing research excellence: dependence on legislative funding will be more than halved, federal funding should double, and the industrial contribution should also increase. And as in the case of the Optical Sciences Center, the economic return to the state will be several times the state investment for the five-year period.

The ASU College of Business has also launched an incubator project under the umbrella of the Hahn Center for Entrepreneurship and Innovation and in conjunction with the College of Engineering and the ASU Foundation. Funded by local business operators and a small number of corporations, the new facility will serve as a laboratory providing hands-on and heads-up business involvement for faculty and students; low rent and shared support services, as well as seed money for new companies; and development services in such areas as further financing, purchasing and marketing. The College of Business will have equity interest in the developing companies, and the corporate partners and the individual limited partners will share in the proceeds when the incubator liquidates its holdings in the successful companies.

The research climate at NAU has also changed in the past decade. While recently reported research into the genetics of flowering plants can significantly affect grain production and the food supply, or research into forest management and replenishment has both environmental and economic implications, or hospitality research can tie directly to the development of the tourist industry, some of the most important interdisciplinary research into the physical and cultural aspects of the Colorado plateau has less immediate economic impact but no less scientific or human significance. In fact the College of Engineering project to equip isolated Indian homes with electrical power generating solar cells constitutes technology transfer of a highly admirable and unusual sort. NAU's growing emphasis on research may be far from UA's achievement or ASU's potentiality as an urban-based developing research university, but it is clearly in a take-off stage and has already added new dimensions to the institution's stated mission and new facets to its past character.

CAUTIONARY CONCERNS AND POTENTIAL DANGERS

Emphasis on economic development and technological competitiveness is both highly appropriate and crucial at the present time, but it can also produce a skewed or inadequate conception of university research, much of which may have significant literary, historical, artistic or broadly cultural importance, without direct economic benefit. A monetary standard is only one measure of a research university's achievement, material goods only one measure of a standard of living or quality of life. An excellent university will demonstrate a balanced excellence and constitute a vitalizing force that affects a community in ways more profound and complex than its contribution to the local economy alone. Economic development is but a means to higher ends, and our universities fulfill their potential excellence by pursuing those means without neglecting those ends. Some faculty are determined to block university research that might have military applications or that includes a proprietary interest; some administrators evaluate a faculty member not only in terms of grant money secured but also in terms of overhead funds generated by the grant. Both extremes indicate a limited understanding of the complex mission and character of the contemporary, state-supported research university. Conflicts can arise from academic-industrial linkages, and faculty peer evaluation procedures can lead to thorny disagreements over tenure and promotion, unless traditional criteria are modified or expanded. Disagreements over the public availability of university conducted research have already arisen. Some faculty members have objected to industry's proprietary need for competitive advantage and argue that industry imposed restrictions compromise academic freedom. These dangers are real, but they are not inevitable and should not obviate the far-reaching advantages of an administrative strategy for maximizing economic development. (Table 1 summarizes the variety of university roles in economic development, the forms it may take, potential benefits, and potential concerns.)

SEMATECH: A CASE-STUDY IN COOPERATIVE INNOVATION

In a complex, highly innovative and admirably cooperative attempt to convince SEMATECH, a major microchip research consortium, that Phoenix was the best site for the consortium's national headquarters, representatives of the city, the state, the non-profit Phoenix Economic Growth Corporation, the Board of Regents and the universities joined in an effort of major significance. The 13 companies joined in the SEMATECH consortium (IBM, Digital Equipment, Hewlett-Packard, AT & T, Motorola, Texas Instruments, Rockwell International, Advance Micro Devices, National Semiconductor, LSI Logic, Micron Technology, Intel, and Harris Semiconductor) aim to restore American leadership in microchip manufacturing and related computer technology. Their goal is not merely to regain a competitive position but to regain a leadership position. The success of the Arizona bid would confirm state, city and university competitiveness, but the mere existence of this innovative proposal goes a long way in suggesting the character of Arizona's growing competitive spirit.

Leading off with the Governor's letter of general endorsement, the proposal becomes more specific with Mayor Goddard's pledge to:

1. Provide the SGS Semi-Conductor facility on a 30-year lease basis, with option to purchase commencing in the tenth year and with rental participation by the City of Phoenix and the ABOR in the amount of $18,750,000;[1]

2. Exempt SEMATECH from paying an estimated $15 million in ad valorem taxes on land and building over a 10-year period;

3. Exempt SEMATECH from paying $210,000 in city development

fees.

Private sector benefits cited in the mayor's letter would:

1. Save SEMATECH at least $2 million in electric utility costs over 10 years;
2. Save SEMATECH at least $5.6 million in employee relocation costs;
3. Save SEMATECH $2.35 million in future land expansion costs.

The President-Elect of the Arizona Board of Regents calls attention to further aspects of the cooperative proposal and conveys the Board's intention to:

1. Designate the SGS Semi-Conductor facility as a university research park, gaining for SEMATECH significant property tax advantages;
2. Allocate $1.5 million a year for 10 years from appropriated funds;
3. Provide university cooperation, technical support and use of facilities and equipment amounting to approximately $158 million over 10 years.

The Phoenix Economic Growth Corporation would issue nearly $70 million in taxable bonds to buy the presently vacant SGS Semi-Conductor facility, which would ultimately be leased to SEMATECH. But before that could be done, PEGC would sell the plant on a 10-year contract to the city, which would resell the property and transfer the title to the Board of Regents, so it could be declared a university research park before being turned over to Phoenix for lease to SEMATECH. The figure of $18,750,00 cited in Mayor Goddard's letter is a compound of the $1.5 million a year pledged by the ABOR for a 10-year period and the $750,000 a year pledged by the City of Phoenix over a 5-year period.[2] The city expects to gain approximately $1 million a year in excise taxes. The benefits to the ABOR may be less tangible, but ultimately more significant through potential effects on university research estimated at $6 to $20 million annually in contracts. The greatest impact, of course, would be on the local economy and on the economic profile of the state.

In addition to the majority of participants, numerous local businesses have offered additional incentives to SEMATECH and its employees. Arizona Public Service, through its Economic Development Rate Incentive Program, has offered discounted rates that could amount to several million dollars in savings over a five year period and double that over a ten year period. American Continental Corporation has agreed to offer 1250 room nights at the Crescent Hotel at approximately half the standard rate for suites and rooms. America West Airlines would offer 250 round-trip tickets at the cost of one-way fares to Chicago, New York and Washington as well as to its western locations. United Van Lines' Phoenix operator, Horizon Moving Systems, would offer substantially reduced moving rates and storage charges. Founders' Title Insurance Company would offer significant savings on insurance premiums and escrow fees. Six local home builders would offer discounts on new homes to SEMATECH employees and several major banks would forego their standard one percent loan origination fee and reduce their rates for fixed and adjustable rate mortgages.

THE SPECTRUM OF COLLEGE AND UNIVERSITY ROLES IN ECONOMIC DEVELOPMENT

ECONOMIC OBJECTIVE	COLLEGE AND UNIVERSITY ROLES	EXAMPLES	POSSIBLE ECONOMIC BENEFITS	POSSIBLE INSTITUTIONAL BENEFIT	SOME POTENTIONAL CONCERNS
Economic research and analysis	Economic data gathering Economic base analysis Industry analysis Strategy development	Cleveland State College of Urban Affrs Eastern Oregon State Regional Services Inst	Better information Improved decisions Effective strategies	Public service mission Community image Student opportunities	Needs not well understood Government/academia conflicts Involvement in local politics Work seen as too academic
Capacity building	Training Technical assistance Building partnerships	U. of Colorado-Denver P/P Center Western Carolina WNCT Tri-State Conference	New local capacity New partnerships	Public service activity Community support Taps faculty skills	Lack of ties to community groups Needs not well understood Involvement in local politics Work seen as too academic
Human resources development	New education programs Continuing education Professional development Extension program	Arizona State Center for Eng Exclnce George Mason Institute of Science & Tech	Skilled workers Means of up-dating Lifelong learning	New students New programs Revitalized curricula Increased responsiveness	Misreading labor market Vocational orientation Inflexible programs Need to cut some programs
Technical assistance	Small bus devt centers Productivity centers Industrial extension Faculty consulting	Georgia Tech Industrial Extension U. of Alabama/GM UT-San Antonio CED	Aid to new and small business Knowledge of mgt. and eng. tools	New business support Research opportunities Consulting opportunities Student experiences	Drain on faculty time Not seen as prestigious Faculty resistance Lack of special resources
Research	Centers of excellence Research consortia Cooperative research Industrial affiliates	U. of Akron EPIC U. of Cal MICRO Michigan State Biotech Center	Technical edge New production processes New products and services	National visibility New research revenues Understanding of needs Access to labs, equipt	Politicization of research Conflicts of interest Threats to academic freedom Economic pay-offs are long-term Undergrad education may be hurt
Technology transfer	Tech transfer program Shared equipt/facilities Faculty consulting Sabbaticals	Ben Franklin Partnership Washington Research Foundation Michigan Industrial Technology Institute	Access to technology	New revenues (royalties) Feedback to classroom Student learning Taps technology base	Lack of industry linkages Faculty resistance Competition with private firms Lack of organizational vehicle Academic/industry conflicts
New business development	Incubators Research park Financing program Entrepreneurship	Utah Innovation Center Texas A&M INVENT Ohio University	New start-up firms New jobs Increased tax base	New revenues (equity) Faculty income Improved industry ties	Lack of strong research base Requires supportive services Restrictive regulations Detracting from teaching roles Replicating inappropriate models

From The Higher Education - Economic Development Connection, SRI International, 1986, p.25.

TABLE 1

The extent of cooperative effort between the public and the private sector in fashioning this proposal demonstrates the growing realization of what it takes to be competitive in attracting new high-tech industry. Only a few months ago U.S. West's $50 million dollar research laboratory went to Colorado because, as a company spokesman put it, "research being done at both the University of Colorado and Colorado State University was the best match for our business needs" (The Phoenix Gazette, October 24, 1987, A-6). The quality and the specific focus of university research apparently swung this decision, but certainly the educational opportunities and the cultural amenities provided by the universities were also factors. Where industries once looked for available cheap labor in location decisions, they now look for available, adequately trained labor or for advanced educational facilities where their employees may develop requisite new skills. They look also for a public school system that can more than adequately prepare children for the kind of higher education they will need in the future. In a relationship of dynamic reciprocity, the competitiveness of a state depends increasingly on the excellence of its universities and of the schools that feed into them. Good business sense would recognize the need to maintain a sound level of investment for a variety of reasons, including the spur to economic development that major research universities now provide.

But the universities cannot effect such potential economic benefits without extensive local and state cooperation. Local economic development corporations, in conjunction with an appropriate state agency, the Board of Regents, and of course the Governor and the Legislature, can fashion an economic climate as important as the physical climate. The transformation of the state Office of Economic Planning and Development (OEPAD) into the Department of Commerce signaled a more aggressive and comprehensive strategy, but we do not yet have much to show for it. We need to regain momentum at the state level. The Board of Regents can continue to encourage technology transfer policies that remove existing barriers. The State of Arizona could institute a new program of matching grants for research projects of potential economic benefit, whereby every dollar of state funding had to be matched by two or three dollars from federal and corporate sources. Such a program should not be lodged in the Board or the universities but in a new agency, perhaps in an existing state department, to indicate that its purpose is economic development, not additional state support for higher education. Such economic leveraging could greatly affect research focused on Arizona interests.

A companion program lodged in the same agency could provide the seed money that would enable innovative enterprises to attract venture capital from private investors. One source of support in many states is a small percentage of the state pension funds; another could be a small percentage of lottery receipts.

These efforts must be coupled also with efforts to improve the cultural climate: creating and maintaining a school system of conspicuously high quality, supporting the institutions and activities that serve aesthetic and humanistic needs, preserving an attractive and healthful physical environment, and providing the public services essential to a contemporary, civilized society.

RECOMMENDATIONS

- The Governor, the Legislature, the Board of Regents, the universities, and local economic development agencies need to develop more effective cooperation and coordination in an effort to attract new industry and encourage home-grown efforts.
- The Board of Regents should continue to encourage technology transfer through policies that lower or remove existing barriers.
- The state should institute a program of matching grants for research projects with potential economic benefit, requiring that every dollar of state funding be matched by two or three from federal or corporate sources.
- The state should also create a companion program to provide seed money to enable innovative, new businesses to attract venture capital from private sources. A small percentage of state pension funds or lottery receipts (or both) could finance this program.
- Both of the preceding programs should be housed in an agency separate from the Board of Regents or the universities to indicate that the purpose is economic development, not increased aid to higher education.
- Cities and the state should work together to support schools of conspicuously high quality and the social, cultural, physical, and aesthetic amenities that make Arizona a desirable place to live and work.

22

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ENDNOTES

1. Subsequently raised to $22,500,000.
2. Subsequently raised to $1,000,000 a year over a 6-year period.

24

THE STATUS OF RESEARCH ACTIVITY AT ARIZONA'S UNIVERSITIES: A WORKING PAPER

MARVIN FISHER

Each of Arizona's universities cites research and graduate education as a part of its institutional mission, yet there are important differences in their historical development and their current status. In the case of the two larger universities, there are also some surprising similarities. This inquiry into related areas of research and graduate education recognizes no particular academic virtue in having the three universities move to a single institutional profile. Rather economy and efficiency justify a reasonable concern with duplication, especially in areas that require expensive equipment or extensive facilities. When universities serve large student populations and are called upon to fulfill the research and educational needs important to existing industry and essential to attracting new industry, reasoned judgment recognizes the inevitable duplication of some functions and facilities. Large universities, sometimes termed multiversities, need not be identical; neither can they be too dissimilar. It might seem frivolous to use Fiesta Mall in Mesa and Christown and Metrocenter in Phoenix as examples. They are certainly not identical but many functions and facilities are very similar, and the population served by each would be greatly disappointed if they could not count on the similarities.

It would be futile and perhaps foolish to try to curb ASU's growing research involvements and accomplishments or NAU's developing research emphases to gain short-sighted or dubious economies. At this point in the twentieth century the needs and resources of the State of Arizona do not justify a scenario reminiscent of nineteenth-century melodrama in which a prudent family has to decide which of their deserving children can be sent to college.

Of course the modern university is neither a merchandising organization nor a for-profit enterprise and the State of Arizona has had enough of melodrama, but the analogy can still be illuminating, especially in view of the economic and chronological diversity of the student population in the major metropolitan centers. The universities serve a clientele much broader and less mobile than the 18 to 24 year old resident student who can live wherever he or she wants to enroll. Maintaining minority access to undergraduate programs and providing post-graduate programs for working professionals are but two examples of important public policy concerns over educational opportunity concerns which relate to both social stability and economic development.

Dr. Marvin Fisher, a specialist in American literature and cultural history, has been a member of ASU's English Department for 30 years, including six as department head. He has taught at three other American universities and three foreign ones. Among his several books is one on the beginnings of American industrialization and its impact on the economy, society, and the imagination.

Some graduate degree programs can be pursued at any of the universities; some broad areas of faculty research are pursued at all of the universities. For both faculty and students, the presence of research activity and the existence of research requirements are essential to the quality and credibility of a graduate degree program. Even those examples of research so specialized that they seem to lack a teaching component may reflect very favorably on the institution, the specific program, and the researchers. To regard research activity as an expensive luxury or a detriment to instruction conveys a misunderstanding of the university in promoting and producing knowledge and a short-sighted view of the economic potentialities of university initiated and conducted research, a subject addressed in an accompanying paper.

THE BREADTH OF UNIVERSITY RESEARCH

As a term, "research" has a relatively narrow denotation in the popular mind and a much broader application in academic parlance. By and large the popular understanding of the term draws upon the laboratory based nature of the physical sciences, engineering, and medicine. It starts with a problem, relies on precise empirical procedures, and aims at a solution which ostensibly has tangible advantages or benefits. The public does not know that much of university-conducted scientific research, and what most distinguishes university research from what goes on at IBM or Pfizer Pharmaceuticals, is actually basic research aimed at increasing knowledge rather than providing practical benefits. Basic research may stimulate subsequent unforeseen applications, but potential applications ought not be a criterion for supporting basic research. The social sciences can also conduct both basic and applied research, even though the methodology may not be as precise and the conclusions more debatable. Historical research moves away from this pattern toward what might be called scholarship. The process of informed inquiry into letters, documents, and records can illuminate past events and uncover unsuspected relationships. It can add to knowledge and deepen understanding, but it lays less claim to tangible utility. The investigator's informed judgment and access to sources are more important than precise measurement or controlled conditions. Literary studies (which can proceed from a historical, political, psychological, or religious perspective, which can embody linguistic or rhetorical methods of analysis, or which can emphasize interpretation, explication, or theory) move even further from the commonly understood pattern of research.

These studies, whether they stress literary history, aesthetic discrimination, cultural integrity, or human values, are aimed at other literary scholars and teachers of literature who can use them for reinforcement or refutation in their own writings or incorporate the new information and insights into their own teaching. Clearly these are much less tangible economic benefits than those that might be derived from research into a potential new energy source or a potentially more efficient means of toxic waste disposal. For fine arts faculty, quality and frequency of performance, exhibition, or publication of creative writing are better gauges of scholarly activity. All of these diverse forms of professional activity, in addition to the major responsibility for instruction, are part of what a comprehensive university expects of its faculty. They are also the basis for evaluating the quality of the institution and determining its competitive reputation.

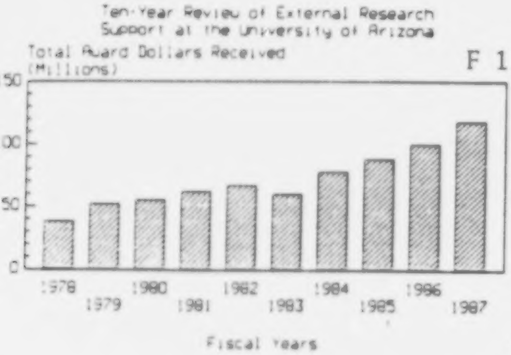
American universities are unique among the institutions of higher education in the world. They are more comprehensive in what they offer and more extensive in what they attempt. Even in the most advanced of other societies one cannot find a college of engineering, law, medicine, business, and fine arts under a single institutional umbrella. And the college of liberal arts and sciences probably does not exist outside the American university. The task of general education precedes university entrance, and foreign universities offer more focused professional preparation. Furthermore, state-supported research institutes devoted to specific scientific or engineering pursuits frequently exist outside the university structure. The appropriate professional activities of faculty at a conservatory of music do not have to conform to those characteristic of an institute of economic research, a school of civil engineering or one of social work. In the U.S., however, major universities now designate themselves as "research universities," and the designation itself leads to internal and external expectations of cross-disciplinary uniformity or conformity which cannot exist. Or it leads to greater internal or external esteem for those whose professional research follows scientific procedures and fulfills pragmatic expectations. The breadth and comprehensiveness of the large American universities require appropriately broad standards for evaluating and esteeming the diverse professional activities that correspond to but are not quite covered by the term "research." We must remember that not even the leading research universities can live by bread alone. But it certainly helps.

STATUS OF RESEARCH AT EACH UNIVERSITY

As one of only 70 U.S. universities classified as Research I institutions by the Carnegie Foundation, the University of Arizona draws upon its historical role and its present character to attract federal funding for research. The Carnegie Foundation classification includes private and public institutions and utilizes both annual totals of federal research and development funds and the presence of doctoral programs in major, specified areas. In the NSF rankings, based solely on an annual tally of federal research and development funds, the UA was 20th among all American universities. Since 1890, when the first such funds were received for its agricultural experiment station, UA has broadened its research activities so that for the present and future, in the words of Dr. Laurel Wilkening, former UA Vice President for Research, "sponsored and unsponsored research must remain a driving force of the University's mission." These research activities are essential (1) to the expansion and promotion of knowledge, (2) the education of students at the graduate and undergraduate levels, (3) the continuing ability of the University to attract creative and productive faculty and the external support they need, and (4) the economic growth and competitive position of Arizona and the nation.

For FY 1987 UA received $154 million to support research activities. External agencies provided $118 million of this total sum for specific research projects. The total also included state allocations for Organized Research Units and indirect cost funds recovered on research grants and contracts. State investment for salaries, operations, travel, and equipment for Organized Research Units was $17 million.[1] Indirect cost recovery on sponsored projects was $19 million, invested in research enhancement and support services. In percentage terms external agencies (federal and state, industrial and corporate, institutions and foundations) provided nearly 66% of the total research outlay, indirect cost receipts provided just over 12%, and state funding provided 22%. Thus externally sponsored projects and related indirect costs provided 78% of the research support in 1986-87.

The record of increase in funding for Organized Research for FY 1977 compared to 1987 is a healthy 294%. If FY 1967 is used as a base for a 20 year perspective, the increase in external support for Organized Research is 1204%, a very substantial figure even if adjusted for inflation. Having achieved acknowledged status as "a major comprehensive research university" the UA has maintained the kind of growth rate which, in the words of the ABOR Mission and Scope Statements, makes it "competitive with the best public universities in the nation." (Figure 1). The institutions ahead of UA in the Carnegie Foundation classification, however, include the best in the land. Remaining competitive in such company will continue to require substantial commitment of state resources.

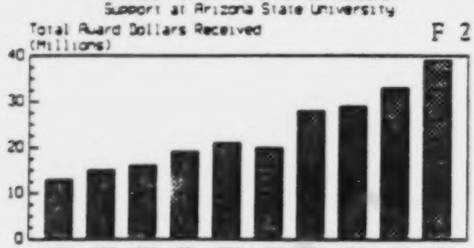


F 1

The faculty is up to the challenge as evidenced by UA's recent selection for both a NASA Research and Technology Center and an NSF Biology Center, in the face of very stiff competition nationally.

The historical roles of Arizona State University and Northern Arizona University in regard to sponsored research differ from that of UA, but in each instance important changes are evident. ASU received slightly over $39 million during FY 1987 in awards for research and academic projects, and expenditures totaled $37 million. This figure includes a construction grant of $5 million from the Department of Energy. The total elevates ASU for the first time to the level of Research II institutions. Awards from the federal government reached $28 million, a figure which puts ASU close to the $33.5 million threshold for determining Research I institutions. But the remaining step may prove as steep as its past progress. Passing the next 20 institutions will require more effort and focused commitment of resources than it took to pass the 50 just overtaken.

State investment in Organized Research at ASU was nearly $8 million, and indirect cost recovery was nearly $6 million. In percentage terms external agencies provided approximately 62% of the outlay for research, state funding almost 22%, and indirect costs approximately 16%. The rate of increase for research funding over the past 10 and 20 years is both revealing and impressive. With FY 1977 as a basis for comparison, ASU's increase in funding for Organized Research is 328% (Figure 2).



F 2

With 1967-68 as a base, the increase approaches 3400% for the areas of science and engineering. This change in research activity Institutional RAI and R&D Expenditure Rankings 1980 and 1985 indicates a rate of progress unlikely to have been matched by any other American university. On the other hand, one can argue reasonably that a 20 year comparison is meaningless for ASU, which began its determined and competitive growth as a research university in the past decade. Within that decade, however, the growth rate substantiates ASU's aggressive fulfillment of its Mission and Scope directive that it pursue its "development as a major research university" and "become competitive with the best public universities in the nation."

Between 1980 and 1985, ASU progressed from 149th place to 94th nationally in federal R & D funds, the second highest improvement rate in the nation, according to National Science Foundation compilations. Since reliance on federal R & D funds is not only indicative of activity but may also be simplistic or incomplete, two UA specialists in higher education research developed a multivariate measure of university research activity. Using 14 variables, they developed a more complete Research Activity Index to rank the top 200 research universities in 1980 and 1985.[2]

Based on their RAI, ASU made the greatest progress from 104th place in 1980 to 63rd in 1985. The status of UA, based on the same two modes of indexing, has remained steady and constant. Its rank as determined by federal R & D funds rose from 24th in 1980 to 23rd in 1985. By the more complex RAI rankings, UA fell from 23rd in 1980 to 25th in 1985. (Table 1). But as mentioned earlier, the resources of UA's competitors make them more formidable than the institutions that ASU has passed in this five year period.

Although the total invested in ASU research is a fraction of what UA received, one must remember the high-ticket units at UA without counterparts at ASU, for example the College of Medicine with $42 million in external support, the College of Agriculture with $9 million, the Optical Sciences Center with $10 million, and the Steward Observatory with $15 million. These four units alone account for half of the UA research funding and none is duplicated at ASU or NAU. And with more than half (54%) of the nation's total R & D awards going to the life sciences and with less than 10% of ASU's sponsored research occurring in the life and health sciences, ASU faces a serious constraint. To continue its momentum and fulfill its stated ambition to pass the Research I threshold, it must plan effectively to strengthen research programs in the life sciences and improve its ability to attract external research funding.

Research at all three universities is diffused through the disciplines, though R & D funds predominantly support science and engineering projects. With 45.4% of its R & D awards in the life sciences (including medicine and agriculture) UA is advantageously positioned to compete in the areas of greatest funding, more so than ASU,

TABLE 1

Institutional RAI and R&D Expenditure Rankings, 1980 and 1985

Institution Name	RAI RANK 1980	RAI Rank 1985	R&D Exp. Rank 1980	R&D Exp. Rank 1985
HARVARD UNIVERSITY	1	1	11	14
UNIV OF WIS-MADISON	2	2	3	3
MASS INST OF TECHNOLOGY	3	5	2	2
UNIVERSITY OF MINNESOTA	4	9	5	6
UNIV OF CAL BERKELEY	5	7	13	9
UNIVERSITY OF MICHIGAN	6	3	8	8
UNIV OF CAL LOS ANGELES	7	6	14	10
JOHNS HOPKINS UNIVERSITY	8	10	1	1
JOHNS HOPKINS U. W/O APL		19		21
CORNELL UNIVERSITY	9	4	9	4
OHIO STATE UNIVERSITY	10	13	23	24
UNIVERSITY OF WASHINGTON	11	11	7	7
STANFORD UNIVERSITY	12	8	6	5
COLUMBIA UNIV MAIN DIV	13	16	10	15
UNIV OF ILL URBANA	14	12	15	13
UNIV OF TEXAS AT AUSTIN	15	14	16	18
UNIV OF SOUTHERN CAL	16	15	17	25
YALE UNIVERSITY	17	21	22	22
UNIV OF PENNSYLVANIA	18	18	12	17
UNIVERSITY OF FLORIDA	19	26	32	29
MICHIGAN STATE UNIV	20	31	19	28
PENNSYLVANIA STATE UNIV	21	22	20	20
PURDUE UNIVERSITY	22	29	28	32
**UNIVERSITY OF ARIZONA	23	25	24	23
UNIV OF CAL SAN DIEGO	24	24	4	12
TEXAS A & M UNIVERSITY	25	17	21	11
NEW YORK UNIVERSITY	26	28	31	34
UNIV OF CAL DAVIS	27	23	25	19
LOUISIANA STATE UNIV	28	27	35	31
INDIANA UNIVERSITY	29	30	63	57
UNIVERSITY OF ROCHESTER	30	45	26	33
UNIV OF CAL SAN FRANCISCO	31	20	18	16
WASHINGTON UNIVERSITY	32	39	29	36
UNIVERSITY OF IOWA	33	38	37	47
UNIVERSITY OF COLORADO	34	37	27	27
UNIVERSITY OF CHICAGO	35	35	30	37
UNIVERSITY OF GEORGIA	36	44	34	35
UNIV OF NC AT CHAPEL HILL	37	36	51	42
IOWA ST U OF SCI & TECH	38	47	36	44
UNIVERSITY OF PITTSBURGH	39	33	60	48
UNIV OF MD COLLEGE PARK	40	32	49	26
RUTGERS THE ST UNIV OF NJ	41	41	55	52
UNIVERSITY OF CONNECTICUT	42	19	39	38

TABLE 1

Institutional RAI and R&D Expenditure Rankings, 1980 and 1985

Institution Name	RAI RANK 1980	RAI Rank 1985	R&D Exp. Rank 1980	R&D Exp. Rank 1985
NORTHWESTERN UNIVERSITY	43	40	43	41
DUKE UNIVERSITY	44	48	50	43
UNIVERSITY OF UTAH	45	56	54	58
CASE WESTERN RESERVE UNIV	46	65	46	61
N C STATE UNIV AT RALEIGH	47	42	41	40
GEORGIA INSTITUTE OF TECH	48	53	33	30
WASHINGTON STATE UNIV	49	59	61	72
BOSTON UNIVERSITY	50	46	78	77
VA POLYTECH INST & ST U	51	51	58	50
UNIVERSITY OF KENTUCKY	52	50	64	67
UNIVERSITY OF CINCINNATI	53	60	68	79
PRINCETON UNIVERSITY	54	52	69	72
OREGON STATE UNIVERSITY	55	55	38	39
BAYLOR COL OF MEDICINE	56	77	53	49
UNIV OF HAWAII-MANOA	57	69	48	59
UNIVERSITY OF KANSAS	58	57	88	102
SUNY AT STONY BROOK	59	61	74	66
UNIV OF MISSOURI COLUMBIA	60	58	57	62
UNIVERSITY OF VIRGINIA	61	49	71	60
SUNY AT BUFFALO	62	34	80	55
UNIV OF NEBRASKA-LINCOLN	63	75	59	65
TEMPLE UNIVERSITY	64	78	91	103
CARNEGIE-MELLON UNIV	65	54	65	51
UNIVERSITY OF MIAMI	66	64	45	54
WAYNE STATE UNIVERSITY	67	74	85	99
FLORIDA STATE UNIVERSITY	68	82	83	88
COLORADO STATE UNIVERSITY	69	72	47	76
VANDERBILT UNIVERSITY	70	70	86	89
YESHIVA UNIVERSITY	71	81	42	45
CALIFORNIA INST OF TECH	72	71	40	46
KANS ST U - AG & APP SCI	73	87	70	85
UNIV ALABAMA BIRMINGHAM	74	88	62	68
UNIV OF MASS AT AMHERST	75	76	99	83
U TENNESSEE KNOXVILLE	76	89	116	132
U OF HOUSTON UNIV PARK	77	95	117	134
HOWARD UNIVERSITY	78	86	122	146
UNIV OF CAL IRVINE	79	66	82	74
UNIV OF CAL SANTA BARBARA	80	85	110	92
UNIV OF SOUTH CAROLINA	81	93	153	114
UNIVERSITY OF NEW MEXICO	82	73	79	73
UNIV OF CAL RIVERSIDE	83	91	76	75
WEST VIRGINIA UNIVERSITY	84	110	95	152
OKLAHOMA STATE UNIV	85	84	81	63
GEORGETOWN UNIVERSITY	86	83	96	100
UNIV OF ILL CHICAGO	87	62	135	64
U TEX MED BRNCH GALVESTON	88	114	101	110
UNIVERSITY OF OKLAHOMA	89	67	102	80

TABLE 1

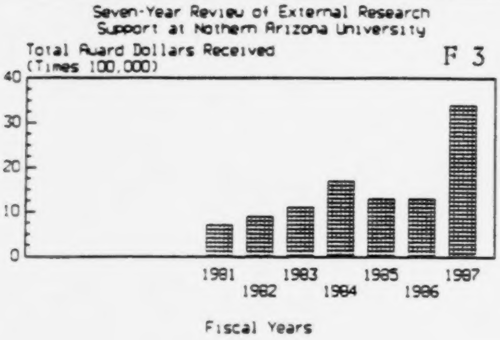
Institutional RAI and R&D Expenditure Rankings, 1980 and 1985

Institution Name	RAI RANK 1980	RAI Rank 1985	R&D Exp. Rank 1980	R&D Exp. Rank 1985
SYRACUSE UNIVERSITY	90	80	100	107
ROCKEFELLER UNIVERSITY	91	68	52	53
SOUTHERN ILL U-CARBONDALE	92	94	154	122
UNIVERSITY OF DELAWARE	93	102	98	108
U TEXAS SYSTEM CANCER CTR	94	90	56	56
CUNY MT SINAI SCH OF MED	95	106	72	82
MISSISSIPPI STATE UNIV	96	103	67	81
U TEX HLTH SCI CTR DALLAS	97	79	73	69
GEORGE WASHINGTON UNIV	98	101	90	128
UNIV OF ARK FAYETTEVILLE	99	104	84	106
AUBURN UNIVERSITY	100	92	87	86
BRIGHAM YOUNG UNIVERSITY	101	116	181	165
TEXAS TECH UNIVERSITY	102	113	113	121
UNIV OF ALASKA FAIRBANKS	103	147	44	95
*ARIZONA STATE UNIVERSITY	104	63	149	94
U TEX HLTH SCI CTR S ANTON	105	103	109	93
CLEMSON UNIVERSITY	106	99	92	90
EMORY UNIVERSITY	107	100	103	91
UTAH STATE UNIVERSITY	108	117	77	84
UNIV OF MED & DENT OF NJ	109	111	119	109

Devised and compiled by Drs. Larry L. Leslie and Kenneth G. Brown, UA which attracts 36% of its R & D funding for engineering projects. Engineering at UA drew 8.2% of the R & D funds in the past fiscal year, and engineering at NAU drew 3%. Strong life sciences and forestry programs at NAU accounted for 57.8% of external R & D funding, far ahead of any other academic division. The plight of the arts and humanities is apparent when one considers that science, technology, social science and education attract more than 97% of the research funding at ASU and more than 98% at UA. Internal grants-in-aid and awards of released time can do much to remedy the imbalance, even though some researchers may question the use of indirect cost recovery funds for such a purpose.

If a 20 year perspective on sponsored research at ASU carries us back to a gestation stage, a 10 year perspective at NAU has the same result. The need for a concerted emphasis on externally funded research was articulated in the 1970's at ASU and expressed in the 1980's at NAU. Even the mission and scope statement propounded for NAU in 1982-83 refers to research as a limited and subordinate part of the university role. In the words of Dr. Henry O. Hooper, Associate Vice President for Academic Affairs, Research and Graduate Studies, "We do not plan to become a 'research university'. Our primary mission is undergraduate instruction with graduate instruction in selected areas. However, there is a strong belief that research activities form an integral part of our instructional program... We believe that faculty must be involved in their discipline as scholars if they are to be excellent teachers." This belief is embodied in a NAU emphasis on early involvement of students in research, on a research requirement for the baccalaureate degree in several science programs, and on learning as an active rather than a passive process. These admirable aims of integrating research and instruction seem both sound and modest for NAU when compared to the more visible attempts of UA and ASU to pursue high technology research so complex and expensive that it requires elaborate federal, state, city, corporate, industrial, and university cooperation. NAU research has a positive effect on the university's predominantly undergraduate educational mission; UA and ASU research has its greatest impact on graduate education and has the additional goal of stimulating economic growth and development.

In the context of NAU's distinct character and circumstances, the development of research activities during the past seven years is admirable and impressive. From 1981 on the rate of growth has accelerated steadily, with an especially rapid increase in FY 1987. For the last complete fiscal year, NAU received $5.6 million to support research activities. State investment in Organized Research constituted 33% and indirect cost recovery 6.23%. From FY 1981 to 1987 research funding at NAU rose 209%; but the rise from 1986 to 1987 alone was 102%. Even more startling is the one-year increase in research awards received from external sources ($3.39 million in 1987, $1.33 million in 1986) a percentage increase of 156%. Such a sharp increase, due mainly to major awards in Biology and Geology, cannot be expected to continue but anything short of a drastic drop would actually contribute to what should be a decade of steady growth in research funding at NAU. (Figure 3).



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Because of its location, NAU has emphasized research in biology, geology, anthropology, and forestry. It has sought and received state support for the Bilby Research Center, a facility fostering interdisciplinary research on problems of an ecological and environmental nature. Another recent addition is the Division of Educational Research, which should add measurably to the activities of the Center for Excellence in Education and strengthen NAU's role of cultural and educational service to American Indians, just as the Center for American Indian Economic Development advances their economic interests. The program in Hotel and Restaurant Management has also added a research institute. Several different departments participate in the Institute for Human Development. Older centers exist for Business and Economic Research, for Vocational Education, and for the study of several geological and environmental phenomena. NAU has identified its regional needs and resources, established areas of strength appropriate to these needs, and recognized the role of research in its continuing institutional development. Lacking the historical emphasis on research that pertains at UA, lacking the burden or blessing of ASU's metropolitan location and urban mission, NAU has not pressed research aspirations as strongly as the two larger institutions. In these less harried circumstances, NAU can boast the most direct justification for and the most conscious integration of research in its undergraduate as well as its graduate programs.

RELATIONSHIP OF RESEARCH TO INSTRUCTION: THE FACULTY AND ADMINISTRATIVE VIEW

To a remarkable degree the heads of academic units and the central research administrators of all three universities, who responded to detailed questionnaires, concur on the necessity of a strong research requirement for most graduate degree programs, the only exception being the permissibility of an appropriate applied project for some advanced degrees in professional or vocational programs. To an only slightly lesser degree, they also stress the desirability of undergraduates encountering research-active faculty members and of gaining first-hand research experience themselves. In research universities many heads of academic units are faculty members appointed for limited terms with the expectation of returning to faculty status. Views reflected in their replies to the questionnaire tend to merge the administration perspective and that of the faculty.

Deans, department heads, research vice presidents, and many faculty respondents insist that research and graduate education are inseparable; some take the relationship a step further and call it "synergistic," meaning not merely a cooperative or reciprocal relationship but one where the result is greater than the sum of its parts. When any existing graduate program is up for review, the evaluators first examine the research records of participating faculty, and at a later stage they look also at the research records of the programs' graduates. When a new program has been proposed, the research records of participating faculty again offer an index to the program's viability. Other criteria also apply and research accomplishments alone do not determine the decision, but no new program can expect approval without the convincing reinforcement of faculty research and scholarship.

Faculty members at all three institutions believe that research invigorates teaching, but interviews with numerous focus groups representing a cross-section of the faculty produced some institutionally distinct attitudes and opinions. At UA, where the emphasis on research has had greater duration and discernibility, the faculty seemed most skeptical about institutional commitment to improving the quality of undergraduate teaching and most dubious about genuine consideration of teaching performance as a factor in promotion and tenure decisions or in merit evaluations. Through the Faculty Senate they have successfully pressed for greater attention to teaching performance as a factor in promotion, tenure, and merit determinations.

By and large, ASU faculty seemed most optimistic about their own and their institution's efforts to balance teaching and research activities in a pedagogically and professionally beneficial combination. They had fewer qualms about the process of evaluating teaching and more faith in departmental and institutional intentions to reward good teaching as well as research productivity. Although they considered evidence of significant research and scholarship as well as teaching ability essential to promotion and tenure, they would also favor teaching assignments and merit evaluations keyed to an individual's specific strengths rather than to a uniform pattern, but subscribed generally to the belief that the most effective teachers were likely to be active in research and scholarship as well.

At NAU the agreement between administrators and department heads about the value of and need for research stands in greatest contrast to faculty views. Faculty repeatedly reported mixed signals about what was required for advancement and they were highly critical of what they perceived as administrative redefinition of the institutional character and mission away from the traditional concern for the quality of undergraduate education and attention to student needs and toward the greater impersonality and different pressures of the research university. They felt that their circumstances and principles of institutional ethics and equity called for parallel routes to professional advancement, flexible criteria that could reward strong contributions to teaching (as fulfillment of a facet of the institutional mission) as well as research productivity. What has come to be called "the two cultures," not C.P. Snow's dichotomy of scientists and humanists, but the protagonists and antagonists of contemporary academe was most apparent at NAU. But what was also apparent was a genuine concern for the students whom the institution served, and this concern provoked the proposition that the most meaningful measure of faculty research and scholarship was not in the number of publications and grants but in the impact that faculty research interests had on students. When this proposition was accompanied by an account of seven NAU undergraduates and one graduate student who presented papers at a regional meeting of the American Chemical Society, it seemed especially persuasive. What it proves, albeit by a parallel route, is the insistence that teaching and research are aspects of a single activity, separable aspects in many cases but inseparable in those highly desirable instances of genuine synergy.

RESEARCH INCENTIVES AND DISINCENTIVES

At NAU, faculty cited heavy teaching loads and inadequate staff support as disincentives to research. At ASU, they felt teaching loads and flexible assignments encouraged research activity, but support staff remained a critical concern. Those in areas where library resources are important to research and scholarship had additional complaints. At ASU graduate students, who do not have the long-term loan privileges that faculty have, were critical of the hours of library services, but ASU and UA faculty felt that they were generally well served. At NAU, however, there are difficulties. One NAU faculty member, a publishing scholar in a humanities area minced no words: "The library sucks. It is deficient in its primary holdings, and wholly inadequate in secondary resources. It has only 1/3 the periodicals necessary for a graduate program and it is barely adequate for undergraduate instruction. It has inadequate space, inadequate staff, and inadequate hours. I have to go to Tempe or Tucson several times a year to find what I need." This is a harsher opinion than was recorded in our survey of university services, but even there NAU library services ranked significantly lower than those at UA and ASU. Such an opinion suggests that more attention to and reinforcement of the academic infrastructure might be required at NAU before some current institutional ambitions can be appropriately fulfilled.

At all three institutions most faculty valued locally administered grants-in-aid of research, especially when they were available on a timely basis, and when they offered research support for less generously subsidized humanities and social science areas. Progress seems most marked at ASU and NAU for such "forgotten" fields. But in those science areas, most of them at UA, where research and equipment costs were astronomical, such aid was viewed as so limited as to be insignificant. These areas called for more state provided seed money, matching funds to reinforce grant applications, more adequate laboratory space, more up-to-date equipment, and start-up costs for new faculty, which ranged from $150,000 to $250,000 for each new hire. Science faculty and administrators at ASU echoed these complaints about a critical space shortage and lack of capital funds for new equipment. ASU's Distinguished Research Award (by means of which recipients are released from classroom commitments but retain responsibility for directing graduate students, while the Graduate College foots the bill for instructional replacement) has broad support and seems well worth consideration elsewhere. As a jury, faculty and department heads remained non-committal on the newly designated Regents' Professorships; they wanted to see how the process worked and what results it produced before they offered a judgment. ASU faculty were less hesitant about judging the means by which mini-grants ($500 or less) could be applied for and awarded. The time expended on the application (10 copies) and the time expended by the sizable committee judging the applications seemed disproportionate to the amounts involved. What was intended as an available aid could function as a bureaucratic disincentive.

Maintaining the established excellence of an outstanding unit such as UA's Optical Sciences Center or Lunar and Planetary Laboratory may require increased state investment even though external funding might have risen from $5 million to more than $10 million in the past five years. It could be penny-wise and pound-foolish to expect a major scientific research operation with such inordinately high start-up costs for new research personnel to depend on external sources for 90% of its costs (including salaries for some tenured faculty). Efficiency requires recognition of the manifold economic impacts of state investment in such conspicuously successful units, and recognition of the inappropriateness of requiring major scientists to go hat in hand to corporate sponsors. Industrial cooperation can be an incentive; academic mendicancy a major disincentive.

At all three institutions faculty and department heads were convinced of the need to support faculty travel to professional conferences to report the results of their research and scholarship, to learn what others are doing elsewhere, and to cultivate the professional contacts important to the competitive reputation of their institutions and the professional future of their graduates. Their reports, however, reveal that within a single institution the amounts allocated to specific academic units in their operating budgets may on a per capita basis vary by tenfold. Dissatisfaction in this area was rife, even in those areas where the bulk of travel costs were covered by grants, and those faculty who cited the discrepancies between the way travel for administrative purposes is reimbursed (travel, meals, lodging, incidentals) and the way that travel for professional academic purposes is supported (cheapest coach fare, no per diem, no registration costs) could be incited to palace revolt or class action suit.

RESEARCH RECOGNITION AND COMPETITIVENESS

The standard measure of academic research and scholarship is through peer review and evaluation. The most substantive forms of research funding and of scholarly publication involve peer review prior to research award or to publication acceptance. Post-publication reviews also affect the author's reputation and that of the employing institution. The amount of research funding is an appropriate measure for those fields where funding is available, and requests for such funding at the national level have become extremely competitive. The majority of federal agencies use the peer review process, and when these panels of experts recommend an award, their recommendation indicates that the technical content is outstanding and the proposal worthy of support.

Both federal agencies and private foundations sponsor award programs for outstanding researchers. The presence of a Nobel Prize winner or of recipients of Pulitzer, MacArthur, Guggenheim, or Kellogg awards reflects simultaneously on the individual, the academic department, and the employing institution. Receipt of such an award alerts talent hunters at distant universities and often sets off a bidding war for the recipient's services that enhances his or her competitive position and tests the employing institution's competitive resolve. Lesser awards, if determined through national competition, can also add to institutional reputation and strengthen competitive position. The number of NSF Presidential Young Investigators' Awards reflects the success of recent recruiting efforts in major scientific fields and the degree of stimulation and encouragement in the institutional atmosphere. Fulbright-Hays research awards and university lectureships, also awarded in national competition, are an index to the global and intercultural interests of the faculty as well as to their professional standing.

One Nobel Prize winner (Physics) is currently on the UA faculty, along with two Pulitzer Prize winners (Fiction and Journalism). Two faculty members have received MacArthur Foundation awards. Since 1984 UA faculty have garnered an average of 10 Fulbright-Hays awards each year, and a total of 12 Guggenheim fellowships, 20 Sloan Foundation awards, 13 National Academy of Science awards and 7 National Institute of Health Career Development Awards. Ten science and engineering faculty have received National Science Foundation Presidential Young Investigators Awards. Several young artists and writers have received National Endowment for the Arts awards and Career Development awards in the sciences. Three more established faculty members have received Humboldt Foundation Senior Scientist awards and another a Senior Fellowship from the National Endowment for the Humanities. Three have received Kellogg Foundation Fellowships, and one a National Medal of Science. Numerous faculty members have been honored with professional distinctions and awards in fields as disparate as archaeology and astronomy or ophthalmology and urology. This distribution of excellence runs through all the customary academic divisions.

ASU is proud of having its first Pulitzer Prize winner (Poetry) and its first MacArthur Foundation Fellow designated in the past year. A second MacArthur Fellow has just been announced. The number of Fulbright grantees has averaged about six each year since 1984, but the number of NSF Presidential Young Investigator awards since 1984 stands at 11. The majority of these PYI awards have gone to younger faculty in Engineering, demonstrating the effectiveness of purposeful recruiting under the provision of Engineering Excellence. The number of Guggenheim awards at ASU has not matched that of UA, but in one small unit, the Creative Writing Program of the Department of English, 6 full-time faculty have garnered 5 Guggenheim awards, evidence again of purposeful and effective recruiting. Three have received Kellogg Foundation Awards, and one a Humboldt Foundation Senior Scientist Award, and one a USSR National Academy of Sciences Medal. Two ASU faculty have received National Institute of Health Career Development Awards, and for 1988-89 two ASU faculty have received appointments to the National Humanities Center in North Carolina. Apart from Duke and the University of North Carolina, both part of the Research Triangle triumvirate, Harvard and ASU are the only universities with more than one representative among the 35 fellows.

During the past five years NAU faculty have received 14 Fulbrights and numerous professional society awards. Two have received National Endowment for the Humanities fellowships. Others have had a Mellon Fellowship, a Danforth Foundation Fellowship, a National Geographic Fellowship, and fellowships from the Clark memorial Library and the Institute National des Etudes Demographiques in Paris.

Such accomplishments as these establish an institution's reputation for excellence, although they may not establish the excellence of its basic instructional programs. In the case of graduate programs, an institution's reputation for excellence can be influenced by the success of its graduates, how effectively they compete with graduates of other programs and what recognition they achieve in their professional careers. But attempts to formulate reputational rankings have not been fully satisfactory. Too often they measure an institution's or a program's renown, invoke vague or impressionistic comparisons, or reinforce an assumed pecking order.

The last, concerted attempt to rank the quality of graduate programs was conducted by the National Research Council in 1981-82. Respondents were asked to assess four aspects of graduate programs in their own disciplinary areas in a number of major universities:

(1) faculty quality,

(2) effectiveness in educating research scholars,

(3) improvement in the last five years, and

(4) familiarity to the evaluators. Only those programs which produced a specified number of research doctorates during a specified span of years were included for evaluation.

No NAU programs were rated, and UA understandably had more disciplines included than did ASU. The resultant rankings are by now obviously outdated, but for the two larger Arizona universities they were problematical even then. Both universities are characterized by the rapidity of their recent growth and consequently rated much higher in the "Improvement" column than in the "Familiarity" column. Even so, both institutions had at least six identifiably strong graduate programs. Were a similar attempt to rate graduate programs undertaken today, both UA and ASU would present some distinctly higher program profiles.

According to graduate deans at the three universities, there is little incidence of losing faculty to more competitive institutions. From department heads and center directors, the message changes a bit: the universities will in most cases take active steps to retain valued personnel but have lost promising and productive faculty, especially in areas where salaries for some tenured positions are not covered by state funds but have to be covered out of grant funds or indirect cost recovery funds. Regents' professorships might help in some instances to keep a highly talented individual from moving, but they are not intended nor can they serve as bargaining chips to keep a star from straying. Warm winters alone will not serve to build or to retain a research active faculty, nor will a merely palliative policy of merit pay. Working conditions that include adequate space, necessary equipment, and library resources, as well as the presence of able students, helpful staff, and efficient administrators, can be as important as monetary reward.

The cost of being competitive in attracting new faculty will vary greatly even when salaries do not. The start-up costs for a promising young researcher may be several times the basic salary. The cost of attracting a major researcher with current sponsored projects seems beyond the reach of even most of the hot science areas. Endowed chairs are a rarity in Arizona's universities and no one has yet begun to campaign openly to initiate an eminent scholars' program, such as Ohio has, to build rapidly in areas of most significant current importance and greatest potential economic impact.

Both UA and ASU have been strikingly competitive in building major research libraries, but the past year has introduced some dissonant notes. First, the good news: The Association of Research Libraries has provided an analysis of library holdings and staff resources that shows UA in 19th place and ASU in 27th place for 1986-87. The rating is based not only on the number of volumes held (UA: 3,239,055; ASU: 2,215,376), but also on the number of volumes added, the number of current serials received, the total expenditures, and the number of professional plus nonprofessional staff. These were highly competitive positions in the rating system and they constitute an area of excellence in both universities, an area recognized and highly valued by faculty.

The bad news, however, is that none of the three universities received an increase in their acquisitions budget for 1987-88, not UA and ASU, which fear a decline in the ARL ratings, and not NAU, which needs badly to improve its holdings and its staffing. ASU needs a 12% increase in its acquisitions budget for 1988-89 just to maintain its present level of book purchases and journal subscriptions. The UA library is in its second year of reducing journal subscriptions by $100,000 a year. Even if the cuts are made judiciously, they will slow the advance and diminish the excellence of a remarkably fine research facility. The diminished value of the dollar in foreign markets and the increased cost of foreign books and periodicals (as much as 60% in one year) have been particularly troublesome. At ASU a $90,000 contribution from the budgets of the academic deans and a $225,000 infusion of indirect cost recovery funds from the Vice President for Research have forestalled current cuts, but the library director estimates that he will need at least a 7% increase in the acquisitions budget if he is to avert reduction of journal subscriptions in 1988-89.

A further problem for the research dimension at the ASU library is that acquisitions for the next few years will have to include volumes purchased for ASU West, virtually all of them duplicating titles held in Tempe. At this stage such use of financial resources to buy duplicates is essential for the academic viability of ASU West, but it comes at the cost of research resources at the Tempe campus.

INCREASING NON-STATE FUNDING FOR RESEARCH

Each university would like to draw more funding from non-state sources, especially in what promises to be a dry year, but there are no easy answers or painless fiscal remedies. After several years of growing deficits, federal R & D funds are not likely to increase. Competition for what is available will be especially keen, and from recent announcements priority emphasis will fall on the kind of research characteristic of interdisciplinary research centers engaged in large-scale team research, rather than on individual research projects. The route to increased non-state funding for research lies through judicious state investment in:

(1) units with demonstrated and effective economic leverage,

(2) the creation of new units in areas of demonstrable research importance, and

(3) the strengthening of existing units in areas of high potential funding.

Such a policy need not ignore or neglect areas of social, cultural, or artistic importance; nor need it create an imbalance between instruction, service, and research responsibilities. It should, however, influence strategic planning, help establish priorities for policy and program changes, and move Arizona's universities into positions of greater prominence through focused attention to measures of research and instructional excellence.

An example of support for an established unit with demonstrated excellence and effectiveness could lie in the current request of the Optical Sciences Center at UA to fund a center for Optical Computing and Optical Data Storage. Over a 20 year period the Optical Sciences Center has received nearly $10 million in state funds and generated nearly $90 million from federal and corporate sponsors. During the past year state investment of $1 million produced a cash flow of $10 million. Four corporate sponsors have already committed $250,000 each for the proposed Optical Data Storage Center, and the scientific need is so great that the state investment cannot fail to produce a manifold return. Outside funding has already given the UA and the state a much finer facility than the state could possibly afford. It is a genuinely national scientific resource and a highly envied example of educationally constructive economic leverage. If Solid State Science and Solid State Electronics at ASU could follow the same pattern, similar institutional and community benefits would result.

An example of a new unit created to meet important new needs is too much an imaginative indulgence at this stage, but such examples would certainly follow if the supercollider were to come to Arizona. The strengthening of existing units in areas of high potential but currently underutilized funding is the most prevalent strategy for increasing non-state research support. ASU's Engineering Excellence program, about to enter its third phase, is perhaps the best example of strengthening a broad band of applied science and technology programs and making them competitive with those of leading research institutions. Engineering currently draws more than one-third of ASU's non-state research funding, and this proportion is likely to increase as Engineering Excellence moves into its third and continues to plan for its fourth phase.

At UA a proposed expansion of Materials Science in both research and instruction builds on an existing area in ways that could significantly transform it, modernize its past focus, and effectively reinforce initiatives in Electrical Engineering, Optical Sciences, Surface Science, and Chemistry. The proposal could lay the basis not only for external funding but for the commercialization of processes and products in electronics and opto-electronics and for student familiarization with equipment not presently available. Such a strategy of strengthening existing units so as to create a new entity with larger research potential is evident also in the reorganization of biology emphases and the focus on insect science that has brought a new NSF Biology Center to

Tucson.

The quality of ASU's life sciences faculty, the availability of funding in this area, and the fact that life sciences currently draw less than 10% of the university's external research support (when more than half of the federal R & D budget goes to the life and health sciences) all suggest the underutilization of faculty resources and research potentialities in this area. But the specter of duplication already affects the further development of what is indisputably an area of strength. The shortage of lab space is a grievous obstacle and a major disincentive. Planning with foresight, investment in needed facilities, and effective recruiting could significantly raise research grant applications and awards. The same strategy, drawing upon resources in Bioengineering, could attract biotechnology (including genetic engineering) firms to the underutilized space in the ASU Research Park. In fact strong life science units exist at all three universities and the faculties have demonstrated research excellence. The problem of duplication might be one of triplication unless each university focuses on distinct areas of life science research.

If NAU were intent on increasing non-state funding for research, the best strategy would seem to lie in emphasizing areas of regional importance and institutional strengths: quaternary studies, forestry and ecology, cultural and economic issues of American Indians, and current problems in education.

CONCLUSIONS

There is no reasonable likelihood that anyone would consider duplicating the most expensive and extensive research facilities, such as the College of Medicine, the Optical Sciences Center, the Steward Observatory, at any location other than their present one at UA. But the inseparable relationship of university research to graduate education, the considerable impact of non-state research funding on the local economy, and the importance of university research, instructional, and cultural resources as a magnet for new industry obviates much of the argument against duplication. More would be lost than could possibly be gained by concentrating teacher education on one campus, life sciences on another, engineering on a third, and so on.

To a great extent, the research accomplishments of the faculty at UA have given us an internationally recognized institution. The growth of programs and the many individual contributions to an enlarged sense of mission at ASU have produced a rate of productivity and improvement unlikely to be matched. The emergence of NAU as a comprehensive university extends educational opportunities and alternatives and serves a population that might otherwise be neglected.

Because of its historical emphasis on research, the UA is a far better university than the State of Arizona could otherwise afford; because of the constructive transformation of ASU many diverse needs of the state's population center are being better met; and because NAU can still emphasize undergraduate education its students can gain some of the advantages of smaller scale and educational intimacy.

RECOMMENDATIONS

- The Board of Regents and the Executive and Legislative Branches of state government should increase support of basic and applied research, scholarship, and creative activity in the three universities as a sound investment in the future of the state.

- The Board of Regents, university administrators, and individual faculty should do a better job of articulating the role of university research in (1) the expansion and promotion of knowledge, (2) the education of students at the graduate and undergraduate level, (3) the recruitment and retention of creative and productive faculty, (4) the competition for external support, and (5) the stimulation of economic growth and competitiveness of Arizona and the nation.

- As part of the strategic planning process, the Regents and the universities should seek to develop the research function of each institution so as (1) to further the institutions' stated mission, (2) to build on demonstrable strengths, (3) to maximize the possibility of external funding, and (4) to provide for state and regional needs.

- The Regents should continue to encourage each institution to develop flexible polices of assignment and evaluation keyed to an individual's specific strengths rather than to a uniform pattern. In recognition of the stated role of teaching and research in each institution's mission, the criteria for evaluation and determination of merit should reward strong contributions to all facets of the institutional mission.

- Each institution should listen to what faculty cite as research disincentives and seek remedies insofar as possible. Among these disincentives: the library at NAU, the level of support for the arts and humanities in each institution, the shortage of lab space and the state of equipment at UA and ASU, the need for state-provided seed money and matching funds, bureaucratic procedures that require the expenditure of more time in preparation and evaluation of mini-grant applications than the amount warrants, and the glaring inequities in distribution of travel funds between units and between administration and faculty.

- Each institution should maintain the strong incentives: The high quality of the UA and ASU libraries, locally administered grants-in-aid available on a timely basis, and the admirably effective Distinguished Research Awards initiated at ASU and worthy of consideration elsewhere.

- The Regents should consider starting an eminent scholars' program to attract highly productive researchers in areas of strategic importance.

- Each university in its strategic planning should develop specific proposals for increasing non-state funding for research, building on present strengths, on areas of increasing research importance, and on the likelihood of high potential funding.

APPENDIX

1. Questionnaire Sent to Graduate Deans and Vice Presidents for Research
2. Questionnaire Sent to Selected Department Heads

GRADUATE DEANS AND VICE PRESIDENTS FOR RESEARCH

Questionnaire Research and Graduate Education Part 1

1. Define or describe the role of research efforts in the present and future plans of your institution. Include any reports or documents relative to this topic completed in the past five years.

2. Describe current dollar levels and sources of funding for research activities.

a. What are the current sources of research funds? List specific amounts for the past fiscal year and the specific sources of grants and contracts for the same period.

b. What range or variety of projects, programs, or equipment purchase is supported by externally funded research? By indirect costs recovered from sponsored research?

c. What is your procedure for recovery of indirect costs or overhead and for distribution of these funds?

3. How have the dollar totals for grants and contracts changed in the last ten years? In the last twenty years?

4. In view of the fact that research activities have been criticized on grounds that they detract from the instructional role of the institution and its faculty, state your views of the relationship between research and teaching at your institution. Consider the effect of research on undergraduate education and its role as a component of graduate education.

5. Approximately what portion of total tenured or tenure-track faculty time in each of the colleges or schools is devoted to research? How much staff time? How much student time?

a. in the case of externally sponsored projects?

b. in the case of internally sponsored projects, including centers or institutes?

c. in the case of unsponsored, individual faculty research?

6. What incentives currently exist to encourage research and creative scholarship?

a. What additional incentives seem to you to have potential benefit?

b. Are there significant disincentives?

7. What are the expectations of research/scholarship in faculty personnel decisions?

a. for promotion to associate professor and tenure?

b. for promotion to professor?

c. for performance evaluation and salary adjustments?

8. What constitutes accurate and appropriate measure of the quality of research and creative scholarship in the various fields represented on your campus?

9. What do you consider a desirable balance between State investment in research (both organized and departmental) and in instruction in your institution? What are the salient factors supporting this judgment?

10. What are your highest priorities for assigning funds?

a. Is the system of decision packages appropriate or effective in identifying priorities?

b. Is the ranking process effective?

c. What follow-up measures help assure accountability?

11. How can funding for research from non-state sources be increased?

a. from corporate sources?

b. from alumni sources?

c. from foundations and institutes?

12. Is there institutional benefit derived from faculty participation in professional service, such as service on NSF panels, evaluation of NEH or NEA proposals, or Fulbright-Hays screening committees? Please explain.

13. How competitive is your institution in attracting and retaining high quality, productive research scholars? How do you measure this sort of competitiveness?

14. From your perspective and experience, how do the quality and quantity of research, including research carried out by graduate students, affect the economic climate or development of Arizona? Can you provide examples of research from your campus that may have directly benefited the economy of the State?

15. Please add any comment on the subject of research not adequately elicited by the preceding questions.

Questionnaire Research and Graduate Education Part II

16. Do you have any data that demonstrate a relationship between the strength of research programs or areas and the recruitment of highly qualified and professionally promising graduate students?

17. Does evidence exist to demonstrate that the State benefits from recruitment of superior graduate students? Consider long-range as well as immediate benefits.

18. Is there a point at which the enrollment of a graduate program or subdiscipline is too low to provide sufficient student interaction and to warrant continuation?

a. What level of degree production might sound such a warning?

b. What criteria other than degree production help determine the viability of a graduate program?

19. What measures are used to assess and to raise the quality of graduate education?

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20. Describe how the number and diversity of graduate programs have changed during the past decade.

a. List the masters' programs and the doctoral programs that existed in 1977.

b. Indicate the introduction of new graduate programs or the elimination of obsolete programs by year through 1987.

c. Indicate plans for new programs or significant changes in existing programs.

21. Describe the quality of graduate and professional programs by reference to bona fide national rankings. You may use approximations such as top ¼, second ¼, etc.

22. Describe the quality of students' admitted in terms of their performance on the GRE or other professional test scores. Are we attracting good students in adequate numbers?

23. Can you provide information about graduate students in your programs?

a. Where do they come from?

b. Why do they apply to your institution?
c. Why do some students who have been admitted choose to go elsewhere?

24. Do you have information on your graduates in their post-graduate careers? Where do they go?

25. What incentives exist to encourage high quality graduate teaching and graduate student supervision?

26. How adequate is the support for graduate students? Cite amounts available and individual stipends for:

a. Scholarships.

b. Fellowships.

c. Graduate Teaching Assistantships and Associateships.

d. Graduate Research Assistantships and Associateships.

e. Tuition waivers.

27. Identify sources of financial support for graduate students in the above categories and for such additional categories as travel, individual research projects (may include support from faculty grants and contracts or support from companies or government agencies that goes directly to the student).

28. Comment on the quality of advising and supervision, on the provision of office space, computer or laboratory support, and travel funds for graduate students.

29. What quality-control requirements exist in areas of research or performance for graduate and professional degrees?

30. Please add any comment on the subject of graduate education not adequately elicited by the preceding questions.

Questions for Department Heads and Faculty of Selected Departments

1. Describe the role of research efforts in the present and future plans of your department.

2. What are the chief sources of research funding in your area?

a. Do these sources meet faculty needs?

b. How would you characterize the role of the administration in aiding your access to research funding? At the college level? At the university level?

c. Could it be improved?

d. How can funding from non-state sources be increased?

e. How do you share in overhead-return funds?

3. How has the research profile of your department changed in the last five years? The last ten years?

4. How has your department been ranked in national surveys?

5. Do you agree with the rankings?

6. What are your views on the relationship between research and teaching, with reference to your department?

a. At the undergraduate level?

b. At the graduate level?

7. How would you define a "research-active" faculty member?

8. What percentage of your faculty do you consider to be research-active?

9. How much time do you expect a research active faculty member to devote to research? To teaching?

10. What do you think of the following research incentives created by the university?

a. Regents' and Distinguished Professorships?

b. Grants-in-aid?

c. Other?

11. What are your requirements of research/scholarship in faculty personnel decisions?

a. For promotion to associate professor and tenure?

b. For promotion to professor?

c. For performance evaluation and salary adjustment?

12. How do you evaluate the quality of research and publication in your unit?

13. Do you have a Gifts and Grants account or any other local discretionary account?

a. What is it used for most frequently?

b. Do you actively solicit contributions to this fund? How?

14. How much is available in your unit for travel to professional meetings? (Do not include travel covered by grants.)

a. How much per capita?

b. Is this adequate?

c. How important is it for faculty to travel to meetings?

15. Summarize your policy for distributing travel funds.

16. How do you initiate decision package requests in your unit?

a. Is the decision-package system appropriate and effective in identifying priorities?

b. Does the system inform you about the status or ranking of your request and the reasons for that ranking?

17. Can you overcome problems of equipment obsolescence by means of current capital equipment allocations?

18. Does the current university capital equipment expenditure for your unit improve or hinder your research effort?

19. How effective have your recent efforts been at recruiting research-oriented faculty?

20. In recent years have you lost any faculty that you tried to retain?

21. Can you describe any social, cultural, or economic benefits to Arizona from research, publication, or performance that originates in your unit?

22. Does your unit attract highly qualified graduate students because of its programs or personnel?

a. Where do they come from?

b. Why do some students who have been admitted choose to go elsewhere?

23. Do you limit graduate admission by means other than customary criteria?

24. What are your criteria for admission of master's students? Doctoral students?

25. Overall, how competitive are Arizona university undergraduates who apply for admission to your graduate programs? What percentage do you reject?

26. How do Arizona university B.A. and B.S. graduates who are admitted to your graduate programs perform in comparison to graduates of other universities who are in your graduate programs?

27. Are you competitive with peer units or institutions in support for graduate students?

a. Scholarships and fellowships?

b. Teaching assistantships?

c. Research assistantships?

d. Tuition waivers?

e. Support from non-state sources?

f. Laboratory or office space?

g. Computer facilities?

28. What could the university do to strengthen your graduate program and make your graduates more competitive?

29. Have you introduced any new graduate programs since 1977? Do you plan to initiate any?

30. How well do your graduates do in their post-graduate careers? Where do they go?

31. How does your department recognize, value, or encourage high quality graduate teaching and graduate student supervision?

32. How do new faculty become familiar with departmental and graduate college requirements and learn to direct theses and dissertations effectively?

33. Are you satisfied with the quality of dissertations completed in your unit? Can you suggest any means of improvement?

34. Please attach a copy of your 1986-87 annual report to this completed questionnaire.

ENDNOTES

1. Almost as much in state support went for the Agricultural Experiment Station, which is budgeted separately from Organized Research.

2. These variables include federal R & D expenditures, library holdings, state and local R & D expenditures, R & D expenditures from industrial sources, R & D expenditures from institutional sources, number of full-time scientists and engineers, number of part-time scientists and engineers, number of other doctoral research personnel, number of full-time science and engineering graduate students, number of PhD's awarded in all fields, number of post-doctoral science and engineering students, total capital expenditures for R & D from all sources and total expenditures for R & D equipment from all sources.

TECHNOLOGY TRANSFER AND ECONOMIC DEVELOPMENT IN ARIZONA

JAMES BROPHY

INTRODUCTION

It is conventional wisdom that national and regional economic growth can proceed from new technologies arising from academic research. Indeed, the nation's competitive position in international markets in today's world is viewed as dependent upon technological creativity and ingenuity stemming from the nation's universities. There exits ample evidence that economic development as measured in terms of new jobs and increased taxes is heavily dependent upon the creation of new businesses and the expansion of small businesses as distinct from the activities of major corporations, although the latter clearly continue to be important. Many states have instituted special programs to encourage the creation and expansion of high technology industry in their regions based on the discoveries and new knowledge developed at their research universities. This report describes the status of this effort in Arizona and suggests opportunities for improvement.

TECHNOLOGY TRANSFER

The application of academic research results to economic development has come to be termed "technology transfer," suggesting the movement of new information and ideas from the academic arena to the corporate world. The phrase really has a much broader meaning because the main mission of research university education and scholarship is clearly a direct application of technology as graduates take new knowledge with them into society. For present purposes, technology transfer is taken to be the process by which academic research results are commercialized through licensing and the formation of new businesses. The success of state and university technology transfer programs can be measured in part by the number of new jobs created and the magnitude of additional tax revenues generated. When put in these terms, concerns are often expressed that a university engaging in technology transfer may experience a distortion or devaluation of its main mission, education and scholarship. Clearly, this need not be so if the academic community has appropriate administrative mechanisms in place, for threats to the academic enterprise come from other directions as well.

TASK FORCE STUDY

This study results from an invitation from the Arizona Board of Regents Task Force on Excellence, Efficiency and

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Dr. James Brophy is Vice President for Research, University of Utah.

Competitiveness to examine the technology transfer effort in Arizona. This includes reviewing the statistics and character of the academic research programs at the University of Arizona and Arizona State University, examining written patent and conflict-of-interest policies, and understanding the technology transfer structure at both institutions. In addition, personal interviews with 69 faculty and staff members at UA, ASU, and the Board of Regents were conducted over a period of four days.

UNIVERSITY TECHNOLOGY TRANSFER PROGRAMS

Administrative offices, policies and procedures for technology transfer are in place at both universities, and the academic research programs are sufficiently robust to serve as a source of many new technologies. Patent and copyright policies and conflict-of-interest and commitment policies at both universities stem from those of the Arizona Board of Regents. As might be expected, the UA technology transfer activity is larger than that at ASU because of the relative sizes of the academic research programs.

UNIVERSITY OF ARIZONA

The academic research program of the University of Arizona exceeds $100 million annually, placing it among the top 20 research universities in the nation. About 70% of the funding comes from federal agencies, principally the National Institutes of Health, the National Aeronautics and Space Administration, the Department of Defense, and the National Science Foundation. These agencies support Research in disciplines in which new discoveries appropriate for commercialization can be expected.

Technology transfer activities are centered in the two year old Technology Transfer Office which consists of one professional person reporting to the Vice President for Research. The major function of the office is to receive invention disclosures or other information from faculty members and to determine if and how to pursue licensing or other commercialization of the technology. It appears that such decisions are made with attention to the advice and wishes of the inventor/faculty member, which is important and appropriate. The Technology Transfer Office publishes a periodic newsletter to inform faculty and others about the program and to encourage faculty participation.

If the decision is made to market an invention by licensing, the Technology Transfer Office usually refers it to Research Corporation Technologies, Inc., a patent management firm, although occasionally a license is negotiated directly from the TT office. Funding considerations generally favor the former approach.

The University of Arizona has helped organize the Arizona Technology Development Corporation, a separate, for-profit company that nurtures start-up companies created to commercialize technology stemming principally from the UA academic research program. To date, six companies have been started and ATDC holds an equity position in each on behalf of the University. ATDC provides pre-venture capital funding, helps with preparing business plans, and places an ATDC officer on the board of each company to provide managerial advice, all of which are very necessary to a beginning company.

At the moment, ATDC is somewhat of a hybrid organization, being for-profit and directly engaged in the operation of private businesses, yet with officers who are UA employees. This may have been the best way to initiate the activity, but it would seem prudent to increase the corporate separation between ATDC and UA so that the University is not viewed as operating in the private sector. Operating expenses and pre-venture capital funds for ATDC come from the University of Arizona Foundation.

ARIZONA STATE UNIVERSITY

In 1987 ASU received $39.2 million in research awards and contracts, placing it in the top 100 research universities in the country. Major federal funding agencies are the Department of Defense, and the National Aeronautics and Space Administration. Federal funding accounts for about 70% of the total effort. Here again, the agency disciplines are those which can be expected to offer opportunities for commercialization.

The Industry Liaison Officer in the Office of the Vice President for Research is charged with the technology transfer program, in addition to other activities involving university/industry interactions. New technology disclosures submitted by the faculty are evaluated with the advice of a patent attorney. The Industry Liaison Officer markets licensing opportunities directly, but also uses the services of Research Corporation Technologies, Inc. where this is appropriate.

The technology transfer program at ASU has not yet participated in a start-up activity, but the creation of a separate, for-profit incubator company is being discussed by members of the Hahn Center for Entrepreneurship and Innovation in the College of Business. Funding from the Arizona State University Foundation is anticipated. ASU has also organized the Arizona State Research Institute(ASRI), a non-profit corporation designed to act somewhat in the nature of an engineering experiment station which makes laboratory facilities and faculty expertise available to local small businesses in a more responsive way than the conventional corporate sponsored research program. Another stated purpose of ASRI is to help start new companies, but little attention has been devoted to this aspect to date.

Apart from the fact that appropriate administrative policies and practices are in place for technology transfer on both campuses, the most cogent statement that can be made is that both programs are new and have not yet had time to mature. A beginning can be reckoned from the change in the patent policy of the Arizona Board of Regents in 1986. Therefore, there is not yet a general awareness on either campus that the Regents and the universities are interested in actively pursuing technology transfer in Arizona.

ARIZONA STATE UNIVERSITY RESEARCH PARK

The financial strictures under which the ASU Research Park operates are such that it can contribute only peripherally to the technology transfer effort. In order to meet fiscal demands, it is necessary for the director to concentrate on attracting existing, large organizations to the park, a difficult challenge in view of competition and the general business climate. The present plan to occupy some 135 acres in the next five years is ambitious but driven by necessity. In the meantime, the park finds it difficult to perform an incubator function for small businesses or to provide expansion space for the crowded ASU academic research program. If the director successfully accomplishes the five year plan, however, the park will contribute substantially to economic development in Arizona.

FACULTY PARTICIPATION IN TECHNOLOGY TRANSFER

Senior faculty members on both campuses feel that their universities have had little experience in technology transfer and that the effort may be too small to be effective. Actually, the level of awareness about the programs is low, but those faculty members who have had some involvement complain that the administration is inflexible and unresponsive to their ideas and that there are "negative incentives" to participation in terms of time demands and exposure to criticisms.

While such comments are somewhat indigenous to the nature of the activity, the negative attitudes are confirmed by the small number of invention disclosures received by both technology transfer offices. The numbers are well below those expected from the size of the academic research efforts at both institutions. The UA has experienced a significant increase in the number of disclosures during the first quarter of this year compared to previous years, which may mean that faculty attitudes are changing.

Faculty attitude problems are being addressed. For example, the new patent policy provides for quite generous royalty sharing. Additional publicity might be given to successful faculty role models in some of the 32 companies UA lists as arising from faculty research interests. Clearly, it is important for the faculty to be comfortable with the technology transfer program for, although less than one percent of the faculty is ever likely to be involved, the academic research program is the wellspring of the technologies that are candidates for commercialization.

Junior faculty on both campuses are basically unaware of the technology transfer efforts. This is appropriate, because younger faculty members need to concentrate on their academic career paths.

Faculty committees, the Technology Transfer Committee at UA and the Patent and Copyright Committee at ASU, monitor patent and conflict-of-interest policies on each campus. These appear adequate to deal with any potential abuses that may arise.

STATE PARTICIPATION

State agencies have an important role to play in technology transfer. The Regents can foster a positive technology transfer climate by minimizing review and approval procedures and promulgating statements and regulations that reduce faculty perception of risk.

It is possible to increase the size of the faculty research effort in those technologies deemed to be suitable for economic development in Arizona by instituting a modest state-supported matching grants program. By requiring two or three matching dollars for every dollar of state funding, Arizona can leverage federal and corporate research that is focused on Arizona interests. A larger research effort in these areas increases the possibility of developing technologies appropriate for commercialization in Arizona.

Such state matching grant programs are most properly placed in the state agency responsible for economic development or in an organization especially created for the purpose, rather than in the Board of Regents. This makes is clear that the purpose of the activity is economic development and not additional state support for higher education. Also, the Board is not placed in the position of appearing to actively sponsor commercialization efforts at the research universities.

One of the major hurdles facing start-up companies is pre-venture capital funding. Currently, early stage funding can be provided from ATDC sources and the incubator facility being organized at ASU, but this is hardly sufficient. A state program to invest in new ventures which would help attract venture capital is highly desirable. A convenient source of such funds may be the state pension fund.

SUMMARY

Most of the elements of a technology transfer program in Arizona are in place. The formal program is very new, however, and while there have been some early successes, the effort needs adjusting and maturing. In particular, greater faculty awareness and support needs to be developed and the Regents should foster a more entrepreneurial climate.

RECOMMENDATIONS

The following are some specific recommendations:

- The Arizona Board of Regents and the universities should streamline their procedures in order to be more responsive to faculty concerns and to develop greater faculty participation in technology transfer activities.
- Both universities should evaluate their participation in private incubator organizations.
- Arizona should consider instituting a matching grants program to increase the academic research effort in those disciplines important to economic development in the state.
- Arizona should consider creating a pre-venture capital fund to assist in the early stages of start-up company development and expansion.
- The Arizona Board of Regents should issue a formal statement on technology transfer which is less obtuse than the formal regulations.

HOW SHOULD UNIVERSITIES RESPOND TO THE IMPERATIVE, "PROFESSORS SHOULD SPEND MORE TIME TEACHING AND LESS TIME ON RESEARCH!"

GEORGE H. DAVIS

ALUMNI ATTITUDES REGARDING THEIR UNDERGRADUATE EXPERIENCE

The Arizona universities' alumni survey, conducted by the EEC Task Force Staff, was an American College Testing Program questionnaire that solicited facts on background, education and employment history. Furthermore, it gathered opinions on the quality and impact of the college experience. Following the battery of standardized questions, respondents were given the opportunity to provide general written comments. Some of the volunteered comments bear directly on impressions of overall instruction, as opposed to instruction received in one's academic major. Even a quick reading of these written comments reveals quite a contrast between NAU alumni impressions of their undergraduate experience versus UA and ASU alumni impressions of their undergraduate experience. The differences provide a useful starting point in addressing the national issue, the great debate, on "research versus teaching" in the modern American university.

Northern Arizona University undergraduate alumni "appreciated small class size and personal attention;" value the fact that they had "full professors for class and not teaching assistants"; "thought that the effort of the teachers was exceptional"; felt that "the small size of classes and the availability of faculty was very important"; and reported that "teachers were a constant source of support, information, and guidance." Positive assessments were occasionally interrupted by disparaging comments such as, "I felt that the quality of teaching was very poor in the liberal arts courses. I really resented being spoon-fed the materials in the courses and prior to exams."

University of Arizona undergraduate alumni who chose to provide written comment felt that "faculty were extremely uneven"; believe that "professors should spend more time teaching"; observed that "fundamental subjects were often taught by foreign teaching assistants

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George H. Davis joined the faculty of the University of Arizona's Department of Geosciences in 1970, following PhD studies at the University of Michigan. His research and teaching have centered on the nature and origin of structures in mountain belts. Davis' undergraduate textbook, Structural Geology of Rocks in Regions, has extended his reach as a teacher to students outside of Arizona, in other parts of the country and the world. He also served as Head of the Department of Geosciences and serves as Vice Provost for Academic Affairs at UA.

who spoke little or no English"; "never felt that the faculty were interested in their welfare"; and urged that one should "always leave open the opportunity to get rid of poor instructors." Disparaging assessments were occasionally interrupted by positive comments such as "majority of professors were excellent and inspiring."

Arizona State University undergraduate alumni who chose to volunteer written opinion felt that "professors do not care about their students"; "science teaching assistants did not speak good English"; "quality of faculty is uneven"; and urged "don't take classes from graduate students," "remove professors who can't convey material," and find "Dr. Deadwood and replace with Dr. Educator, leaving Dr. Research in the laboratory where he is happy." Disparaging assessments were occasionally interrupted by positive comments such as "I enjoyed very much my academic experience at ASU. Nearly all the teachers were excellent."

THE MISSION FACTOR

These comments and general observations are probably not truly representative of the overall opinions of all alumni for each of the three universities. The self-selection at work in the volunteering of written comments results in strong opinions, but not necessarily representative opinions. But we take this input seriously as a starting point in this discussion because it so effectively captures public perceptions of what is good about teaching-oriented colleges and universities, and what is bad about research-oriented universities.

The alumni attitudes invite questions like: "Why can't the undergraduate classroom experience at Arizona State University and University of Arizona be more like the undergraduate experience at Northern Arizona University?" "Why do the University of Arizona faculty have to spend so much time on research?" "Why do the classes at Arizona State University have to be so large?" "Why are so many courses at research universities taught by teaching assistants?"

University mission is the major factor. Whereas the mission for Northern Arizona University is fundamentally directed toward undergraduate education, the missions for the University of Arizona and Arizona State University have substantial research dimensions. The University of Arizona is charged by the state to be among the most competitive PhD-granting institutions in the nation. Arizona State University is charged by the state to develop as a competitive research university.

For a university to fulfill the dual mission of teaching and research, each faculty member is given a dual assignment: to teach and to carry out substantive research. Most Arizona State University and University of Arizona faculty teach fewer courses per semester than most Northern Arizona faculty. Almost all faculty at the University of Arizona and Arizona State University teach undergraduate courses and graduate courses, whereas most Northern Arizona University faculty teach mainly undergraduate courses.

The extra requirement of research prevents most faculty at the University of Arizona and Arizona State University from being as available to undergraduate students as they would be if their assignment was strictly one of instruction. Add to this the raw numbers of students that characterize large, public research-oriented universities; add to undergraduate instructional requirements a large order of graduate/professional instructional responsibilities; add the cohort of graduate students who depend on experience as laboratory assistants, discussion leaders, or instructors as a primary part of their professional education; add the fact that, nationwide, most graduate students in engineering and mathematics are foreign nationals whose first language is not English; and we see with full force the vulnerability of universities with significant research missions to undergraduate criticism: too much research, not enough teaching, and too much teaching by graduate students.

THE ISSUES ARE LARGER THAN ARIZONA

The national measuring stick for assessing the quality and stature of comprehensive universities is calibrated in first-order units of research scholarship, as defined by research expenditures and strength of PhD programs, and undergraduate student quality, as defined by SAT or ACT scores, high school class ranks, and high school grade point averages. Public universities whose admissions requirements are not particularly selective concede the possibility of establishing nationally recognized stature on the basis of the quality of their undergraduate student body. Instead, research productivity becomes the avenue for attracting national and international attention, and for exerting national and international intellectual influence.

Given this perspective, it naturally follows that decisions on promotion and tenure for individual faculty members are heavily influenced by quality of research scholarship, number(s) of books and journal articles, and number, size, and significance of grants and contracts. Outstanding undergraduates, who look ahead to graduate and professional studies, pay attention to the national stature of the universities they consider. Those universities and states that attract the best graduate and professional students are the richer for it.

Institutions of higher learning like the University of Arizona and Arizona State University, charged by their home state through the Board of Regents to assume a viable, competitive position nationally, must hire faculty that have the potential of teaching effectively while at the same time developing a national, if not international, reputation for creative scholarship. Faculty recruitment thus is carried out with foremost attention to identifying and hiring individuals who have clearly established a record of outstanding scholarship, or who show promise to do so. This is not to say that effectiveness as a teacher does not merit close and careful consideration, for it does. However, the best universities have learned that it is possible to hire excellent scholars who are at the same time outstanding teachers, and it is this goal that drives most recruitment searches for new faculty.

THE FEDERAL CONNECTION

The emphasis on research scholarship as a measure of university stature and as a fundamental component of promotion, tenure, and salary adjustment partly reflects the synergistic relationship that has evolved over the years among universities, the Federal Governement, State Government, and the private sector. It is revealing to learn how crucial it is for professors who are scientists or engineers to win support from agencies like the National Science Foundation or the National Institutes of Health. Seldom are scientists at research-active institutions promoted and tenured without having established that the Federal Government has seen fit, following peer review, to support the work of the faculty member under consideration. This fact illustrates the degree to which the Federal Government harnesses university professors as vehicles to carry out fundamental basic and applied research, not just as a service to society, but as a critical dimension of America's ability to maintain a competitive position in the world. This is probably not obvious to undergraduate students, nor should it be.

SCHOLARSHIP, AND STEWARDSHIP OF HUMAN KNOWLEDGE

When students enter the environment of a university, we want them to fall under the influence of active researchers and creative scholars and artists. Universities are niches in society where human knowledge gained over time is guarded and preserved, and where the quest for and the discovery of new knowledge is pursued. Faculty attempt to prepare and motivate students to master it, and to develop a sense of value for it.

Stewardship of human knowledge requires more than storing and cataloging. It requires pouring through what exists while constantly appraising and reappraising its content and value. Such appraisal is most effectively driven by active research, scholarship, and creative expression. There is no agency external to faculty that prescribes what of the limitless bounds of human knowledge should be presented in the few lecture hours of a given semester. Some sense of what must be shared is derived in part from values and priorities acquired through graduate and professional school experience, i.e., on experiences which, over time, recede further and further into the background of one's career. The main insight regarding what must be shared is derived from what has become valued during the course of personal scholarly and/or artistic activities, and that of colleagues. These activities result in a testing and checking of what is important to the individual scholar, and to colleagues within an academic discipline. If a gulf widens between what is presented (i.e., passed on) and what is known to be valued, then the professor's capacity to motivate students to value and to master what in fact is presented may be diminished.

ROLE OF THE TEACHER

Commonly the term "teacher" is used in too limited a way, with emphasis on classroom contact with students, out-of-class contact with students, including advising, but with little emphasis on preparation for contact with students. When "preparation" is viewed broadly and generously, it becomes obvious that research, scholarship, and creative expression contribute to it. Within a research university, part of the preparation for teaching chemistry is functioning as a research chemist; part of the preparation for teaching art is discovering new knowledge through creative expression; part of the preparation for teaching humanities is to explore ancient civilizations through patient, protracted excavation of the right sites.

Students in all fields, whether engineering, journalism, or business, commonly feel that they are in good hands if they know that they are being taught by someone who knows the real world. Why? Because the ongoing practical activities of engineering or journalism or business in the real world help to sort out what is to be mastered and what is to be valued. Students have the sense that these "real world people" know what to present. The real world for faculty in a research university is the arena of research and scholarship -- the arena in which they function not as teachers, but as artists and engineers, lawyers and sociologists, i.e., as masters of their professional field.

Professors in colleges and universities whose mission emphasis is teaching of undergraduate students are required to stay up to date in their field of study by keeping up with the literature, attending professional meetings, engaging in some scholarship, and taking full advantage of sabbatical leaves to catch up on the literature and to function as scholars uninterrupted by heavy teaching demands. Such faculty are not generally expected or required to make fresh, original contributions, although some often do. Increasingly, however, colleges and universities that traditionally have emphasized undergraduate teaching are raising the research/scholarship expectations they hold for their faculty. Part of this initiative is the faculty themselves, expressing how vital research and scholarship are to their professional work as teachers.

Faculty in research-oriented universities are expected to deal with human knowledge at the margins...where recently acquired knowledge is used to test old assumptions, and where fast-breaking new knowledge is being integrated with what already is known to exist. Active scholarship is absolutely essential to this process.

UNIVERSITY INSTRUCTION

Within research universities, courses like entry-level English, mathematics, and foreign languages that are most like high school courses can and, for financial reasons, must be taught by instructors who do not have research requirements as a part of their job responsibilities. Emphasis in such instruction should be on clarity of presentation, thoughtful organization and choice of topics, availability outside of the classroom, and an obvious personal interest in students and teaching. Our undergraduates should expect to receive no less than this.

The non-basic skills courses in a research university must be taught by actively engaged scholars and artists or adjunct faculty who simultaneously are discovering new knowledge, preserving it, and transferring it to students in ways that will make lives more meaningful and productive. Emphasis in instruction should include clarity and organization, exceptional judgment in selection of relevant topics that are right up to date, significant substance, and unsurpassed mastery of concepts.

There comes a point where the research emphasis becomes so dominant that it obstructs the possibility of responsible, responsive instruction. How do we know when the point is reached, or exceeded? What are the signs?: Too many absences at professional meetings; unavailability outside of the classroom; unpreparedness for lecture; the lack of extra effort that is revealed in old tired examples instead of new lively contemporary illustrations; overspecialized content in comparison to what the course has advertised; very small teaching load semester after semester; and certain attitudinal characteristics, some none too subtle, such as direct statements in class saying "I don't really like to teach."

Universities should respond to the imperative, "Professors should spend more time teaching and less time on research," by recognizing that **time is not the issue**. Rather, it is the quality of time, the quality of instruction, that is delivered to the undergraduates that is at issue. Research-oriented universities have the human resources to provide exceptional instruction to undergraduates and they need to do so more consistently and more evenly.

THE IDEAL WORLD

Our undergraduate students in research universities should ideally bask in a world where scholarship...avid, thirsty scholarship, is clearly and conspicuously visible to them, so they are moved by the substance and by the passion for learning and inquiry that is so clearly modeled by the professor. We want our students to be around people who bring the subject area alive because they are players.

Timothy S. Healy, President of Georgetown University, cited John Henry Newman's remark: "we can get information from books, but real learning must come from exposure to "those in whom it lives." President Healy goes on to say: "When a student sees that the professor is the live embodiment of a discipline, when he understands in class or lab the excitement as well as the stress of discovery, when in his later and graduate years he actually shares in problems that lie on the edge of knowledge, all this can turn his learning upside down, make it live and breathe. The world of ideas is very human indeed, so the familiar slides easily into rote, the already known quickly turns to boredom. But let waft across the enterprise even a whiff of a real frontier and attention stiffens and excitement grows."

Mastery of content, depth of creative insight, and passion for the subject,--if these characteristics are sufficiently powerful, large class sizes and relative unavailability outside of the classroom will not weigh too heavily in the overall experience.

RESEARCH VS TEACHING

A factor that works against the universities as they try to interpret and explain the role of research is the way in which the expectations and requirements of mission, and promotion and tenure, are described. University narratives on promotion and tenure, for example, tend to split teaching and research into separate categories, as if these activities cleanly can be divorced, one from another. This approach tends to disguise the fact that research provides insights that enhance the substance of what is taught and how passionately it is taught. This approach tends to discount the fact that new ideas for research spring from class presentations and discussion, that new ideas spring from the dynamics of the classroom.

Perhaps it would be better to rewrite promotion and tenure expectations in a way in which professors are viewed as scholars and creative artists at work on several fronts that are internally coherent. Universities might wish to emphasize more strongly that they intend to promote the development of a community of scholars that creates an environment that will enrich the educational experience of students and colleagues, that will promote original contributions in human knowledge and in artistic expression, and that will result in enrichment of society as a whole.

The expectation for each scholar is to continuously strive to master the branch (or branches) of knowlege relevant to his/her discipline, to develop and communicate nationally and internationally new knowledge through original work, and to systematically and clearly pass on the best of what is known in ways that will motivate students to both master and value this new knowledge.

WHAT IS THE BEST THAT RESEARCH UNIVERSITIES HAVE TO OFFER TO UNDERGRADUATE STUDENTS?

Public universities, in general, have not been successful in convincing society that excellence in research and excellence in teaching, including undergraduate teaching, go hand in hand. The more that universities, faculties, and boards are able to demonstrate that this is the case, especially to our students and to the outside constituencies of parents, alumni, and legislators, the more the universities will be valued.

Research universities offer three resources which undergraduate colleges and universities whose fundamental mission is teaching do not: (1) a large number of research-oriented faculty members who are actively contributing to the advancement of the discipline with which they are associated and by which they are motivated; (2) the presence of graduate students, who serve as role models for lighting the path of early-career professional development beyond the undergraduate experience; and (3) modern, sophisticated laboratory equipment and instrumentaton won through hard-earned federal grant money and competitive petitioning for state support. Each of these resources affects the undergraduate major. The more these resources are brought into close contact with our undergraduates, the richer the experience of the undergraduate student and the wiser the decision to pursue undergraduate education at a quality, large-enrollment, research-oriented public university.

VALUE OF RESEARCH-ORIENTED FACULTY

Research universities such as the University of Arizona and Arizona State University need to do a better job of marketing what it means to be a faculty member at a major research university. What must a scholar or artist be prepared to do to stay at the forefront of his/her field?: 1/ Compete successfully for public or private money on the basis of provocative ideas, workable strategies, and evidence of proven professional accomplishment and/or compelling professional promise; 2/ Push one's skills and expertise to the limit in making an original discovery, an original interpretation, an original creative expression; 3/ Maintain close contacts with colleagues nationally and internationally, communicating ideas and interpretations through performances, presentations at meetings, and publishing of articles at frequent intervals in recognized peer-review journals; and 4/ Recruiting and supporting outstanding graduate and professional students, involving them in the scholarship and preparing them for their respective career paths. These activities alone may require a 30-/ or 40-hour week, without mentioning the academic responsibilities of teaching undergraduate and graduate courses and advising undergraduate and graduate students. Research demands can be astonishing, and the requirements for professional accomplishment and recognition in the creative arts equally astonishing.

Professors, in the ideal world, are up-to-date contributors in their fields and, collectively, they are able to see in advance, and even help determine, where their discipline is heading. The values and goals which faculty members possess, combined with faculty perceptions of their discipline and its direction, profoundly influence mattters of teaching and advising, the planning of curriculum, the designing of individual courses, and the evaluation of the promise of students.

Universities should more effectively explain to those outside of the institutions that faculty members at large research universities find themselves continuously shifting and adjusting their teaching and research loads, searching for an effective balance which if found is all too quickly lost. If they shift their activities and energies too far away from the students they are to serve, the students find themselves inadequately served. On the other hand, if faculty members shift their activities and energies "too far" studentward, they may find themselves slipping behind in the research productivity they expect for themselves and which others expect of them. In short, it is not straightforward to balance both the challenges required for scholarshsip with the significant responsibilities of teaching and advising.

Too often faculty members are seen by undergraduate students simply as conveyors of knowledge, as contrasted with discoverers of new knowledge. This is not so much the fault of the students as it is of the faculty and the institution. When faculty members permit their identity as scholars to be exhibited in lecture or lab, e.g., by demonstratively drawing upon their wealth of experience, the resource called "research oriented faculty" begins to have a dramatic impact on the undergraduate experience. It can illuminate what scholarship is all about. It can lead to the setting of higher goals. It can help disclose the true nature of the academic field that the undergraduate is about to enter. To be sure, when faculty members share their scholarly dimensions, interests, and habits with their students, important messages are conveyed that are invaluable.

VALUE OF GRADUATE STUDENTS

The resource called "graduate students" is simply not part of the experience of undergraduate students at colleges and universities whose mission is mainly teaching. It is well known that graduate students, as teaching assistants, contribute significantly and often very positively to undergraduate education at large-enrollment public universities. Yet, they are often the objects of criticism. Foreign national students, for example, who emerge from intense competition in their respective homelands to carry out graduate work in the United States, are especially vulnerable to criticism in the classroom, because English may not be their first language. Depending on circumstances, graduate-student teaching assistants may be viewed by undergraduates as welcome providers of undivided personal attention and down-to-earth explanation, or as obstructions which prevent undergraduates from coming to know their professors.

We often hear undergraduates praise graduate students as among the best instructors they have had. But the immeasureable value of graduate students in undergraduate education does not rest necessarily with the specific teaching functions they perform. Rather their primary value may be in the role-modeling that graduate students, perhaps unknowingly, provide to those junior and senior majors who are fortunate enough to see that graduate students are emerging professionals and scholars involved in an exciting phase of their career development.

Seeing graduate students in action can be a revelation to undergraduate majors. For example, the undergraduate learns through the number, diversity, and depth of M.S., M.A., and PhD research projects that there is much new ground yet to be explored in the search for new knowledge. Undergraduates who penetrate graduate-student office complexes are privy to discussions and arguments that attack the "truths" which comprise the fundamental body of knowledge of undergraduate education. The undergraduate soon learns that some truths can be upheld while others must be modified or abandoned altogether. In close contact with graduate students, undergraduates learn that in order to grow as professionals they too must begin to question more rigorously, to begin to identify an area of concentration that suits them, to select and gain entrance to an appropriate professional or graduate school, or to explore more knowledgeably for a job in the private sector. Those that are inclined toward further education learn that they must begin to select and gain entrance to an appropriate graduate school, to somehow find an advisor, to define a research problem or creative activity, to launch into high-energy commitment to the program and project, and to eventually transform the experience into a defendable thesis or dissertation. There is great urgency to do all of this, for the alert undergraduate recognizes very quickly that graduate students only one or two years older than they have somehow managed to insert themselves into the all-encompassing graduate experience: "How did they do it?" "How will I do it?"

Early discovery of the life and scholarship of graduate students can result in tremendous academic growth. The influence of graduate students can provide a greater seriousness as well as a greater pleasure to the undergraduate experience. In short, undergraduates who encounter the phenomenon called "graduate education" have the chance to make career decisions earlier and in a more informed fashion. Those students who decide to pursue careers in scholarship are more likely to make a smoother transition into graduate school and the research functions that surround it. Ultimately, the insight derived should quicken the pace and smooth the road to greater academic maturity.

THE VALUE OF MODERN EQUIPMENT

Students quickly see through the canned laboratory experiments centered about out-of-date, worn equipment. In contrast, they are likely to respond more enthusiastically when entrusted to "real" data gathering and experimentation using modern equipment in actively functioning laboratories. Although some departments still reserve such equipment for use by graduate students and faculty, other departments have learned that undergraduates, given the opportunity, respond as if they were being paid the highest compliment, in a way that delivers the sensation that a 15-year-old feels upon dismounting from the mini-tractor lawnmower and slipping into the driver's seat of the family car. Although both for learning and safety the first trips are supervised experiences, they are nonetheless unforgettable.

The opportunity to gain experience in modern laboratories at large universities, or to harness a state-of-the art computer, or to perform on a brand new musical instrument, enhances the education of the undergraduate not because of the gleam of the equipment, but because of what the equipment represents and because of the activities it generates. This equipment, in turn, is available because of the research emphasis of the university, and success in the severe competition for research funding.

CONCLUSIONS

Arguing that good research and good teaching go hand in hand is not a matter of marketing. It is a matter of demonstrating that this is the case to our own undergraduate students...by giving them rich experiences in the classroom and the labs. This requires each faculty member, each department, each college, and each university to define the optimum balance between teaching and research, with the "optimum level" expressed in a balanced equation between serving students and serving the research and service mission requirements of the individual institution. The more that undergraduates are brought into close contact with the energy of scholarship, research, and performance as embodied in the interests, activities, and enthusiasm of its faculty and graduate students, the better the quality of the learning experience, and the greater the chances that the universities can erode the dogma that good research and bad teaching go together. In short, we will over time have more advocates to affirm that outstanding research and outstanding teaching do go hand in hand.

THE QUALITY OF GRADUATE EDUCATION AT ARIZONA'S UNIVERSITIES

MARVIN FISHER

In an effort to determine what doctoral graduates of the three Arizona universities thought about the strengths, weaknesses, and overall quality of their specialized graduate programs, we prepared a 35 item questionnaire to be sent to 1976 and 1986 doctoral graduates. The alumni associations provided mailing lists for more than 1200 students. Because foreign addresses would produce problems of return postage and delayed delivery, they were removed from the list. Of the 1109 sent out, a total of 125 were returned as undeliverable. The total number of graduates sampled thus came to 984.

The 441 analyzed responses constituted a return rate of 44.8%, a highly respectable figure, especially since no follow-up reminders were sent. Of the 441 responses utilized 210 were ASU graduates, 197 UA graduates, and 38 NAU graduates. (A copy of the questionnaire is appended to this report.)

The ASU graduates included those who were awarded Ph.D. degrees in a variety of fields, as well as those awarded Ed.D., D.B.A., D.M.A., and D.P.A. degrees. The UA graduates included a preponderance of Ph.D. degrees and a few Ed.D.'s. The NAU graduates were mainly recipients of the Ed.D. degree and only 7 Ph.D. recipients. The ASU and UA respondents included approximately twice as many males as females. The NAU respondents were almost evenly divided by gender.

No attempt was made to survey students who failed to complete the programs to which they were admitted. The alumni associations would have no such lists, but each graduate college could produce a list of those who, in recent years, dropped out without completing their advanced degree programs. If such a group were surveyed, their attitudes might well be less commendatory toward their institutions; on the other hand, the real reasons for dropping out might well have more to do with their own circumstances than with attributes of their institutions. We recommend that the universities undertake such a study.

Most of the questions are keyed to the respondent's experience with his or her graduate program and require recollection of details that could be difficult for some of the 1976 group. Some of the questions call for evaluation of program quality, of program requirements, and of faculty personnel. A few concern the students' ability to compete professionally after graduation. Only one question asks for a pre-program perception: #6 which asks for the major factors underlying the choice

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Dr. Marvin Fisher, a specialist in American literature and cultural history, has been a member of ASU's English Department for 30 years, including six as department head. He has taught at three other American universities and three foreign ones. Among his several books is one on the beginnings of American industrialization and its impact on the economy, society, and the imagination.

of graduate institution.

In this instance, the responses clearly indicate that UA graduates more often chose the institution because of the reputation of a particular program or of a particular faculty member. These factors also appear in the responses of ASU and NAU alumni but not with the same frequency.

SURVEY RESULTS

The most important question in the survey is #7: "Overall, how satisfied are you with your doctoral program?" Respondents could indicate a) very satisfied, b) generally satisfied, c) somewhat dissatisfied, and d) very dissatisfied. The results for the combined 1976 and 1986 groups from all three universities are 43.6% "very satisfied," 44.5% "generally satisfied", 9.6% "somewhat dissatisfied", 2.2% "very dissatisfied". The segment recording general to high satisfaction is a remarkable 88% -- an enviable rate of consumer approval. For the 1976 group, all universities, the results are 46.7% "very satisfied", 39.6% "generally satisfied", 8.6% "somewhat dissatisfied", 5% "very dissatisfied" -- a satisfaction rate of 86.3%. For the 1986 group, all universities, the results are 41.1% "very satisfied", 46.8% "generally satisfied", again a satisfaction rate of almost 88%. With only three 1976 doctoral graduates responding from NAU, percentages are less meaningful; but 2 of the 3 were "very satisfied." For UA 1976 graduates, the results were 46.3% "very satisfied" and 43.3% "generally satisfied" -- a satisfaction rate approaching 90%. For ASU 1976 graduates, the results were 46.4% "very satisfied" and 37.7% "generally satisfied" -- a satisfaction rate of 84%. For 1986 NAU graduates, the results were 62.9% "very satisfied" and 34.3% "generally satisfied" -- a 97.2% satisfaction rate. For UA the results of the 1986 sample were 34.1% "very satisfied" and 50.4% "generally satisfied" -- an 84.5% satisfaction rate. For ASU the results of the 1986 sample were 41.8% "very satisfied" and 46.8% "generally satisfied" -- a satisfaction rate of 88.6%. The opinion of those who dropped out could affect these approval ratings significantly; but lacking that information, we would have to conclude that the Arizona universities enjoy broad and deep support from doctoral graduates of recent years.

Question 8 asked for specific changes that would strengthen the respondents' doctoral program. Many 1976 graduates mentioned changes that they knew had since been instituted, some called for changes which they hoped had been instituted (such as more emphasis on computer applications in a given field), others felt that the elapsed time obviated useful suggestions. The 1986 graduates offered many more recommendations, often with a relevancy to specific programs that makes them difficult to cite or summarize in this report. They frequently called for more conscious attempts to recruit and retain faculty who displayed care and consideration for their students and who possessed and commmunicated familiarity with current research. Some respondents cited the need to trim "deadwood" in the faculty ranks, but more cited instances of helpful and knowledgeable faculty members. The results of questions 8 and 10 (which asked for changes in course requirements) would be of greater use to the individual graduate colleges, who could look for patterns of response in particular programs. For the future, it would seem worthwhile for graduate colleges to use a survey similar to this one to poll doctoral graduates about two or three years after completion of their degree programs. It could provide information to reinforce quality control measures already in use in some of the universities.

Questions 11-15 focused on the preliminary or comprehensive examinations which precede the candidacy or dissertation stage of the doctoral program. These questions concerned the number of examinations (#11), the scope (#12), the difficulty or ease (#13), and their relevance to the degree program (#14). In each case only one possible answer indicated approval that requirements were "about right" and the percentage of approving responses for each question was #11 -- 87.5%, #12 -- 87.4%, #13 -- 90.7%, and #14 -- 84%. These results indicate extremely strong belief that the required examinations were appropriate, effective and relevant. A related question about the personal value of the dissertation asked "As an educational experience, was your dissertation a) very beneficial, b) beneficial, c) not very beneficial, d) definitely not beneficial?" The responses again reflect student approval of their graduate experience: a) 51%, b) 41.6%, c) 6.2%, and d) 1.1% -- with 92.7% viewing their dissertations as a beneficial educational experience.

Several questions related to the helpfulness (#19), the availability (#20), and the competence (#21) of the supervising professor. In each case the available responses were a) extremely, b) somewhat, and c) not very. The results were #19, a) 63.6%, b) 27.8%, c) 8.6%, #20, a) 66.5%, b) 25.8%, c) 7.7%; #21, a) 74.9%, b) 19.7%, c) 5.4%. Variations for each institutional group were slight, and the overall conclusion is that a significant majority of dissertation directors are perceived by their former students as having been extremely helpful, readily available, and extremely competent.

Questions 22 and 23 dealt with the participation of committee members other than the supervising professor. The range of responses was a) very extensive, b) somewhat, and c) not very. The results were a) 17.2%, b) 47.1%, c) 35.7%. This question exposes a weakness or inefficiency in graduate college procedures. In the vast majority of instances the students did not find their committee members other than the supervising professor extensively involved in the process. The graduate colleges at UA and ASU have recognized this and permitted doctoral committees to be reduced with departmental consent from five to three faculty members, plus a faculty member representing the Graduate College. Such a reduction in number should intensify or concentrate committee familiarity with the field and interest in the dissertation.

When asked to rate the helpfulness of Graduate College staff 37.4% considered them "very helpful," 37.6% "moderately helpful," 13.3% "not helpful," and 11.6% "had no contact." For the 1986 group alone, the ASU graduates rated Graduate College staff considerably higher: "very helpful", 52.8%; "moderately helpful," 40.3%, "not helpful," 4.2%, and "no contact," 2.8%. The UA 1986 graduates rated the Graduate College staff "very helpful," 32.1%; "moderately helpful, 35.8%; "not helpful," 21.7%; and "no contact," 10.4%. For NAU the results were "very helpful," 68.8%; "moderately helpful," 25%; and "not helpful," 6.3%.

Combining the "very helpful" and the "moderately helpful" categories, we find

ASU totaling 93.1%, UA 67.9%, and NAU 93.8%.

Several questions dealt with the financial strain of pursuing a graduate degree. Since the survey reached only those who completed doctoral degrees, the result might have been significantly changed if those who did not finish had also been included. Overall the doctoral graduates from 1976 and 1986 reported that 20.3% had great financial hardship, 50.5% had some hardship, and 29.2% not much hardship. Approximately three-quarters of the group held assistantships or fellowships, so some of these recipients must have experienced financial hardship also. More specifically, 8.7% did not have to work outside their graduate studies, 18.5% needed to work up to one-quarter time earning support funds, 27.4% worked one-quarter to one-half time, 27.4% also reported having to work one-half to three-quarters time, and 18% had to work three-quarters to full time while pursuing their graduate studies.

Asked whether their doctoral programs prepared them to compete in their chosen fields, 44.6% reported being "very well prepared," 46.1% "fairly well prepared," 8.2% "not well prepared," and 1.1% very poorly prepared." Combining the first two categories, we find that 90.7% of these graduates felt themselves well prepared for their ensuing professional responsibilities. Overall 81.3% are currently employed in the field of their doctoral work; for the 1986 group alone, the figure is 85.7%; and for the individual institutions, the 1986 figures are UA 83.3%, ASU 89.9%, and NAU 77%.

One question (#33) inquired about current annual income and all but a few responded. The breakdown for the 1976 and 1986 groups follows; the second column for each group indicates the number of respondents in each income category:

	1976		1986	
ASU				
under $20.000	1.6%	1	5.6%	8
$20.000-30.000	1.6%	1	24.6%	35
$30.000-40.000	23%	14	28.2%	40
$40.000-50.000	28%	18	25.4%	36
$50.000-60.000	28%	18	14.1%	20
over $60.000	14.8%	9	2.1%	3
UA				
under $20.000	7.4%	5	9.8%	12
$20.000-30.000	4.4%	3	34.7%	43
$30.000-40.000	23.5%	16	27.4%	34
$40.000-50.000	19.1%	13	17.7%	22
$50.000-60.000	12.2%	11	8.1%	10
over $60,000	29.4%	20	2.4%	3
NAU				
under $20.000	33.3%	1	2.9%	1
$20.000-30.000			28.6%	10
$30.000-40.000			25.7%	9
$40.000-50.000	66.7%	3	17.1%	6
$50.000-60.000			17.1%	6
over $60.000		3	8.6%	3

The most important conclusions to be drawn from this survey are the extremely strong approval of the quality and relevance of graduate programs at the Arizona universities. This approval covers the totality of the graduate experience as well as specific aspects such as number, design, and effectiveness of required examinations and the professionally beneficial quality of the dissertation experience.

The supervising professor is a key element in this educational experience, and Arizona graduates rated their mentors very high in qualities of helpfulness, availability and competence. They were less generous in viewing the participation and involvement of other committee members, and the results support the greater efficiency from smaller committees -- three rather than five members.

Graduate College staff were generally perceived as helpful in all three institutions, but a lower rate of approval at UA would seem to justify some closer attention, particularly in light of low ratings indicated by our Task Force survey of administrative services and discussed elsewhere in our working papers. It should be noted that in July of 1987 the Graduate College at the University of Arizona was reorganized, in part to address these types of problems.

Even though more than two-thirds of these doctoral graduates reported financial hardship in their years of graduate study, even though three-quarters of the group held graduate assistantships or fellowships. Neither the 1976 group nor the 1986 graduates could live off their stipends without drawing upon other resources or incurring debts.

Overall, they view their graduate programs as strong preparation for their professional careers -- preparation that enabled them to compete effectively with graduates of other universities.

INSTITUTIONAL EFFORTS, ACTIONS, AND PROCEDURES

Each of the three universities has a Graduate College responsible for monitoring the policies and procedures governing admission, progress toward a degree, and graduation requirements. In practice, each tries to recruit and admit the best students possible, to increase minority enrollment, to maintain program quality, and to graduate well prepared and fully competitive scientists, scholars, and professionals. Each has tried to maintain equality of opportunity and to attain quality of result.

Nowhere in our universities are the possible contradictions between the goals of maintaining equality and attaining quality more apparent than in our graduate schools. Some of the traditionally elitist schools, Stanford or Yale, for example, appear to be among the most successful in recruiting minority candidates for undergraduate and graduate degrees and providing them with the opportunities, the financial aid, and the academic support services that enable them to overcome a legacy of historical and social inequities. These elite universities have more funds for recruitment efforts and sustaining services than most state universities have, but state universities in areas of growing minority populations have become acutely aware of society's need and their responsibility to draw minority students into higher education, the sciences, and the professions. Ideally, every minority graduate with an advanced degree will have a multiplier effect on the youth of his or her ethnic group, attracting and encouraging scores of potential students who need living evidence of their career possibilities. To put it most succinctly, we will not see our Hispanic, Black, and American Indian citizens in our classrooms, laboratories, administrative offices, and board rooms in sufficient numbers until we see them in our graduate schools first.

The excellence of graduate programs, no less than undergraduate ones, lies not only in what we can do for the most gifted students we can attract but in what we can do for those whose promise is often in proportion to the obstacles they have had to overcome and the insecurities they still feel as they begin their graduate studies. The welfare of society, the stability of our communities and the prosperity of the nation will depend on our ability to develop the best in those superior students we attract and to provide the best possible educational experience for the rest we attract, regardless of ethnicity. Harmonizing the goal of equality of opportunity and the goal of cultivation of quality has long been the concern of American higher education; it is even more essential as we try to plan intelligently for the future.

In order to provide equality of opportunity, each institution has several admission categories. Regular admission is granted to applicants who meet the grade average criteria and the course requisites for a specific program and who can present strong recommendations, if program requisites so specify. Both UA and ASU indicate the necessity of presenting the appropriate, nationally normed aptitude or advanced knowledge test scores and at least a 3.0 g.p.a. for the last two years (60 hrs.) of undergraduate course work. NAU does not specify either as standard criteria, but individual degree programs may do so. At present only the ASU Graduate Catalog has an index listing for "Minority Recruitment and Support," an oversight that should be remedied quickly by UA and NAU.

UA and ASU both list a category of admission with deficiencies, stipulating that the identified deficiencies must be completed without being counted toward the graduate degree. NAU uses provisional standing for students with deficiencies, but permits a maximum of 12 graduate credits earned during provisional status to count toward the degree. ASU and UA use provisional admission for "a student who does not meet minimum academic standards but has counterbalancing evidence to suggest potential for success." After completing 12 graduate credits and meeting the specified provisions, the student will gain regular admission or be withdrawn from the program. All three universities have a category of non-degree status, permitting students with undergraduate degrees to take graduate courses without completing the normal admission procedure or without having met the normal requirements. Both UA and NAU permit a maximum of 6 graduate credits earned by a non-degree student to be counted toward a degree if the student subsequently gains regular admission; ASU permits 9 graduate credits to count toward a degree.

Thus all three universities seek to maximize equality of opportunity through a process of flexible classification that provides access to graduate study to applicants who vary in the extent and quality of their undergraduate preparation. Three categories seem to have sufficed at NAU; ASU and UA operate with four categories and may gain additional flexibility through its distinguishing "provisions" from "deficiencies."

RECRUITMENT EFFORTS

None of the universities has kept or could easily obtain data regarding the percentage of minority applicants accepted for graduate study and the percentage denied, though all now recognize the need to do so. The lack of information is not surprising, nor is it evidence of culpability on anyone's part. However, it does not speak well for the accountability measures which should be an integral part of any minority admission and retention program. The greater likelihood of discriminatory policies thirty or forty years ago led to a period of more consciously evenhanded treatment with no questions asked about race or ethnicity. Efforts to implement affirmative action policies in the 1970's produced fitful reactions almost as often as they produced fruitful consequences.

At this point in the 1980's quotas are out but goals are in. The effort to increase minority representation in graduate programs is not only morally informed but also socially responsible and intellectually grounded. It is more pragmatic in its operation than ideological in its motivation. Arizonans and their political leaders have not been conspicuous for their social and political foresight; but the evidence of demographic trends and their consequences has begun to penetrate some of the harder shelled realists.

The University of Arizona has invested considerable resources in its efforts to make graduate study available to minority students, but the Vice Dean feels the need for better coordination to make those efforts more productive and has described the recruitment program as a series of present efforts and future plans.

PRESENT

1. Eight $10,000 fellowships allocated to departments to recruit minority students. Graduate Tuition Scholarships available for these students, if needed. Areas chosen are those where minority students are underrepresented and where effective recruitment plans exist.

2. These monies, when coupled with other sources of funds, allow us to fund 15-20 minority graduat students per year. In addition 15-20 Graduate Academic and Graduate Tuition Scholarships are allocated each year for minority students. Increasing Graduate College $10,000 Fellowships for minority students to 20 for 1989-90.

3. Five areas with minority underrepresentation (Geosciences, Linguistics, Anthropology, Optical Sciences, and Electrical Engineering) chosen for participation in the Patricia Roberts Harris federal grant program.

4. 50 of the Associate Dean's time is spent on affirmative action activities. She is in contact with the Office of Minority Student Affairs and its three assistant deans, the Affirmative Action office and individual minority students who seek assistance from the Graduate College. An associate dean for minority students will be hired in the near future.

5. The opening, administration and planning of the American Indian Graduate Center is a milestone at the University of Arizona. The center, which is coordinated by the Intertribal Council, an Advisory Board and the Associate Dean will be sued mainly as a palce for Indian students to meet and hold events of interest to Native Americans. The peer mentoring and having a place to meet will undoubtedly result in eliminating the feeling of isolation reported to us by Indian students and help to retain this population so important to the state of Arizona.

6. Colloboration with Pima Community College by a "Visiting Scholar Program". The Graduate College has contacted the President of Pima Community College and has agreed to send two minority doctoral candidates to teach two courses a semester at Pima Community College. The purpose of this project is to have minority students at Pima see their peers in professional positions and serve as an incentive to pursue graduate studies. Planned for the Fall is one class in Humanities and

another, not yet determined.

7. Both the Vice Dean and Associate Dean schedule time once a month for counseling and mentoring minority graduate students. The Deans use these meetings to identify procedures and initiate action to resolve them and to develop new policies and procedures.

8. Participation in three consortia that provide names of prospective minority graduate students and their areas of interest:

   1) Project 1000, targeted at Hispanic students;

   2) Western Name Exchange, listing many varied groups and areas of interest; and

   3) Graduate Opportunities for American Indians. Names of prospective students are sent to appropriate academic units, which then write to the students.

9. Preparation of a brochure on graduate education at UA aimed at minority students.

10. Preparation of a slide presentation for faculty to use on visits elsewhere.

11. Scheduled visits by Graduate College academic staff to minority institutions.

12. Identification and utilization of minority alumni for recruiting.

13. Providing recruitment plans and necessary funds to departments for implementation.

In an ABOR report on "Minority Recruitment and Retention," dated December 4, 1987, comparative data are provided for each university. At UA Graduate College enrollment was as follows:

	MALE					FEMALE				
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
Fall 1986	65 3.5%	17 .93%	74 4.0%	25 1.4%	1654 90.1%	96 5.5%	23 1.3%	38 2.2%	32 1.8%	1560 89.2%
Fall 1987	77 4.5%	26 1.5%	81 4.7%	17 1.0%	1507 88.2%	81 5.1%	24 1.5%	44 2.8%	33 2.1%	1405 88.5%

The strongest claim that one could make for these figures is that minority enrollment in most categories is edging upward.

Scholarship aid for 1986-87 (including Summer '87) was allocated as follows:

MALE					FEMALE				
Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
15 5.5%	8 2.9%	14 5.1%	12 4.4%	223 82.0%	32 13.7%	2 .86%	9 3.9%	14 6.0%	176 75.5%

Other forms of financial aid (loans, grants, employment) supplemented scholarships, but the division of scholarships is indicative.

Advanced degrees in the graduate/professional category for 1985-86 and 1986-87 (men and women) were awarded as follows:

	Hispanic	Black	Asian	Indian	Other
1985-86	59 3.4%	21 1.2%	28 1.6%	9 .5%	1626 93.3
1986-87	43 2.5%	9 .5%	30 1.75%	6 .25%	1630 95.0%

During this limited period from 1985-86 to 1986-87, the number of graduate/professional degrees awarded to minority students edged downward in most categories at UA.

ASU seems a bit farther along, according to a summary of Graduate

College initiatives for minority students, 1986-88. The major initiative combines a special admissions category with an academic support program focused on minority applicants. An assistant dean of the Graduate College describes it thusly:

One of the earliest and most important Graduate College programs was its "Academic Support Program," which is closely tied to special admissions. This program was designed not to be a "quick-fix" for minority underrepresentation among faculty and students, but to have the long-range effect of increasing the number of minority graduates who, in turn, increase the pool for potential faculty recruitment. Early in the conception of this program, it was realized that we would need to admit a larger number of minority students than in the past to meet this goal. To do so, we would have to admit from a pool of students not showing the same numerical academic profile (grade point average, standardized test scores, etc.) as the majority population. Clearly we would need to take account of a variety of indicators to predict minority students' success in graduate school. Equally clearly, disproportionate numbers of minority applicants would be older students, would have academic deficiencies, and would have a high level of financial need. Accordingly, we recognized that many minority students are caught in a "Catch 22" situation of being "marginal admits," whereby they (a) would not be eligible for regular departmental competitive, merit-based funding, (b) would have a greater financial need (thus would be accumulating a larger debt burden) than majority students, and (c) therefore, would have to work. These very circumstances pose a great risk for failure during the first year (or perhaps two) of graduate school.

The Graduate College Academic Support Program was created two years ago to meet these needs. Because most departments are properly reluctant to admit marginal students, and because the Graduate College was unwilling to admit students without a fair chance of academic success, we included certain features in this program to help departments get students successfully established during their first year. For a student to be eligible for the program, a department must offer the student regular admission, thus encouraging the department to claim ownership of, and assume responsibility for, the student, even though the student under other circumstances would be admitted provisionally if at all. Only with the regular admissions can the beneficial features of this program go into effect. The program works as follows.

The first element of the program is financial assistance. From Set Aside Funds and tuition and fee is that these marginal students, who were at academic risk under the best of conditions, would be virtually assured of academic failure if forced to work excessively to support their education. For the first two years of the program, we simply used grant funds to meet each student's needs as determined by the College Board's Financial Aid Assessment and the ASU Financial Assistance Office. Using these criteria, we were able to fund approximately 20-25 students for 1986-87 and for 1987-88.

In 1988-89, because of increased recruitment efforts (which will be addressed later) our pool of potential special admissions has expanded to nearly 100 students. To meet this larger need, we have included an additional feature in the program. With the cooperation of the ASU Financial

Assistance Office, we have identified funds to provide 30 need-based GA's at $2,500. Students receiving these awards will be hired into their own departments and will not be permitted to work more than ten hours per week. The awards are a combination of federal work-study funds ($54,000), Graduate College contribution ($13,500) and department match ($13,500). In effect a department can hire a .25 FTE GA for $378. These awards create an early, personal relationship between faculty members and students--an import key to student success in graduate school--and provide the added benefit of involving students in departmental life early in their graduate careers.

The second element of the program is individual mentoring. The Graduate College provides each minority student with a departmental peer who works with him/her for three hours per week, acclimating the new student to graduate school and to the culture of the department. The mentor does not necessarily act as a tutor (we have other means of teaching content). Rather, the mentor is an established peer who helps the "mentee" become a part of the informal information flow of the department, which is crucial to the survival of a graduate student, and more generally helps socialize the student to graduate school.

The third element of the program is faculty advisement. A faculty adviser must be assigned to the student to insure that someone in the department has responsibility for the student.

ASU is in a good position not to repeat the errors of other institutions that initiated minority programming at an earlier date. The benefits and merits of the Academic Support Program, and what should assure its success for students, are the components that get the student involved early on in the life of the department and into contact with a faculty member and a student mentor. Although the large fellowship programs which were developed at some universities did provide necessary funding for graduate study, fellowship programs often had unwittingly built in a failure factor: although the students were handsomely funded, they were isolated within their academic units, resulting in a high rate of attrition and academic failure. Academic support does not negate the need for financial aid, or course. In fact, the ASU program is designed to help marginal students meet the costs of graduate education without working excessively, while bringing them fully into their departments.

This innovative program is reinforced by several initiatives keyed to the group of minority applicants admissible under the standard criteria but not fully competitive for departmental teaching and research assistantships:

GRADUATE COLLEGE MATCHING RESEARCH ASSISTANT PROGRAM

One new source of funds from the President's Office will be used to target a well-prepared minority student population through awarding research assistantships. Funds will be used to augment existing deparmtental funds on a competitive basis. Departments who award a quarter-time or larger assistantship to a minority student can apply to the Graduate College for an additional assistantship of the same fractional FTE for a second minority student. A minimum of six such matching research assistantships will be awarded. These awards are not necessarily for recruitment, but may be used to enhance the participation and support of minority students in their departments.

RESEARCH ASSISTANTSHIPS FROM VICE PRESIDENT FOR RESEARCH

Another source of funding for the better prepared students is a block of research assistantships from the Office of the Vice President for Research. Six awards are available, each one-half time FTE for an academic year at a total value equal to the department's established rate.

AMERICAN CONTINENTAL SCHOLARSHIPS

For Project 1000, headquartered at ASU and targeted specifically towards Hispanic students, $5,000 has been awarded by American Continental. For this new program, awards will be coupled with waivers of tuition and fees.

PATRICIA ROBERTS HARRIS FELLOWS

From the federal government, ASU will have six Patricia Roberts Harris fellowships, two continuing and four new awards in Psychology, Chemical and Biological Engineering, and Public Affairs.

TUITION AND FEE SCHOLARSHIPS

For 1988-89, blocks of Regents Graduate Academic Scholarships RGAS for (in-state fees) and Regents Graduate Tuition Scholarships RGTS for (out-of-state tuition) were reserved for recruiting and retention awards upon application by departments. These blocks of awards were held back as supplements to the RGAS and RGTS awards allocated all departments. The RGAS (in-state) block was also designed to support departments in topping off graduate assistant offers, which carry only remission of out-of-state tuition.

Realizing that these special initiatives in behalf of minority student enrollment in graduate programs depend upon attracting a large number of applicants, ASU has generated mass mailings to students in the Educational Testing Service ETC Locator Service and the Western Name Exchange. Follow up telephone calls and correspondence have substantially increased the number of students applying. For 1988-89, ASU devised a tracking system to monitor the admissions process of every minority student to insure appropriate treatment in the deparments and to use limited resources to best advantage in competing for good students. The Graduate College's Admissions Office will flag all minority applications; to assure expeditious evaluation, a form letter will be attached to minority students' files when they are forwarded to the departments. This procedure will facilitate maintaining detailed records of the kinds of students applying and will help departments with admissions decisions. As a part of assisting departments and attracting admitted students to ASU, the Graduate College provides travel money to fly admitted minority students to the ASU campus for recruiting visits (continuing a program begun in 1987-88).

Not only has ASU expanded efforts for reaching a national and regional pool of students, it has also focused on local undergraduate minority students as a potential pool for graduate school recruitment. This past spring semester, the Graduate College was host to ASU undergraduate students who were identified for participation in the Western

Name Exchange Program. These students were invited to a workshop in which they were given information on how to seek out and apply to graduate school and acquire financial aid. The workshop was followed by a banquet dinner. Attracting students to the program was a cooperative effort involving undergraduate units, who helped contact and personally invite students; many graduate academic, service, and administrative units were represented at the dinner. This university-wide effort to aggressively encourage ASU's minority students to consider graduate study will be repeated next year.

The limited data from the ABOR report cannot serve to evaluate the potential effectiveness of these ASU initiatives but should provide a base for subsequent evaluation:

Fall 1986	MALE					FEMALE				
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	172	70	144	28	3820	248	71	101	36	4812
	4.1%	1.7%	3.4%	.7%	90.2%	4.7%	1.3%	1.9%	.7%	91.3%
Fall 1987										
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	168	74	158	31	3892	251	108	101	47	5141
	3.9%	1.7%	3.7%	.7%	90.0%	4.5%	1.9%	1.8%	.8%	91.7%

Clearly no progress can be discerned from these figures.

Scholarships for 1986-87 were allocated as follows:

Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
32	23	23	14	779	84	28	16	19	811
3.7%	2.6%	2.6%	1.6%	89.4%	8.8%	2.9%	1.7%	2.0%	84.7%

Since UA allocations for scholarship aid to minority graduate students exceed ASU scholarship awards percentage-wise for 1986-87, there is room for ASU's special initiatives to take effect.

Advanced degrees in the graduate/professional category at ASU for 1985-86 and 1986-87 were awarded as follows:

1985-86	MALE					FEMALE				
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	22	7	11	5	568	34	13	15	9	569
	3.6%	1.1%	1.8%	.8%	92.7%	5.3%	2.0%	2.3	1.4%	88.9%
1986-87										
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	25	4	20	4	582	38	14	13	4	717
	3.9%	.6%	3.1%	.6%	91.7%	4.8%	1.8%	1.7%	.5%	91.2%

Although there are no clear indications of minority progress in earning graduate degrees at ASU from 1985 to 1987, there are marginally better graduation rates than at UA.

Graduate College efforts to increase minority student enrollment at NAU have gained focus since 1986. Currently they consist of the following:

1. Participation in the Educational Testing Service Minority Graduate Student Locater Service. Letters and brochures sent to prospective applicants by the Graduate College and by appropriate departments.

2. Participation in the Consortium for Graduate Opportunities for American Indians. This consortium of 15 universities is now headquartered at NAU and is committed to increasing American Indian representation in graduate programs, with the ultimate goal of their becoming faculty members.

3. Recruitment trips to California universities and state colleges in 1987. Plans to extend visits to New Mexico in Fall 1988.

4. Participation in the Patricia Roberts Harris Fellowship Program to attract minority students to the areas of Business, Forestry, Biology, and Educational Administration at NAU.

5. Monthly monitoring of departmental

efforts at minority recruitment.

6. Distribution of materials to minority student advisor throughout the U.S.

7. Reserving a percentage of graduate assistantships for minority students and liberal use of tuition scholarships for minority students.

8. Future participation in Project 1000 aimed at increasing Hispanic enrollment in graduate programs.

Minority enrollment data for NAU's Graduate College follows:

Fall 1986	MALE					FEMALE				
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	47	4	8	32	969	68	17	9	131	1414
	4.4%	.38%	.75%	3.0%	91.4%	4.1%	1.0%	.55%	8.0%	86.3%
Fall 1987										
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	64	8	5	39	955	87	15	6	89	1675
	6.0%	.75%	.47%	3.6%	89.2%	4.6%	.8%	.32%	4.8%	89.5%

Increases in some categories seem to be offset by drops in others, so the data serves to provide a base rather than suggest a trend.

Since NAU did not separate undergraduate scholarship aid from graduate aid, we move to the area of graduate degrees awarded for 1985-86 and 1986-87:

1985-86	MALE					FEMALE				
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	5	1	0	6	114	9	2	2	8	231
	4.0%	.79%	0	4.8%	90.5%	3.6%	.79%	.79%	3.2%	91.7%
1986-87										
	Hispanic	Black	Asian	Indian	Other	Hispanic	Black	Asian	Indian	Other
	8	2	3	3	180	4	1	0	6	234
	4.1%	1.0%	1.5%	1.5%	91.9%	1.6%	.4%	0	2.4%	95.5%

None of the three universities has for the Fall 1985 and 1986 semesters awarded more than 10% of its graduate degrees to minority students. But in each case this period coincided with emphasis on and new initiatives in minority student recruitment. It should be instructive to see whether these efforts produce measurable gains, especially in the case of ASU's extensive effort to add further flexibility to minority admissions, remove barriers to financial aid, and create a network of support for minority students. For good reason, any productive efforts to recruit, retain, and graduate minority students should be shared and emulated by all three universities. The technology of effective recruitment is worthy of institutional transfer.

The recruitment of superior students has not been forgotten while the universities seek to implement their social agenda. The enrollment and graduation of superior candidates for advanced degrees has many advantages for any university and is even more essential for a research university. The quality of graduate students impacts the quality of undergraduate teaching, the quality of research, and, because so many graduates with advanced degrees remain in-state, the cultural and economic climate of the state.

Superior graduate students are more likely to be drawn to institutions with strong reputations in their field of disciplinary interest or to institutions where a particular individual is known to them or to one of their undergraduate teachers. A study of limited dimension based on data 5 years back demonstrated that strong departments at UA drew applicants with mean Graduate Record Examination scores significantly higher than the national means for those disciplines. Thus the ability to attract high quality students is discipline-dependent, and stronger departments were better able to compete effectively with the best departments nationwide.

Each of the graduate college deans complained about the inadequacy of scholarship funds available for recruiting superior students and the scarcity of research support or travel funds for students already enrolled. The exceptions are those graduate students hired under the auspices of externally funded research projects. These grants are often written with more generous provision for graduate student support than teaching or research assistantships could provide. Laboratory and office space are not ample, and computer access is sometimes very limited for graduate students. Both ASU and NAU graduate colleges set aside a sum for graduate student travel to present research results at conferences. UA students must depend on departmental funds, often quite limited, or the provisions of research grants, of which UA of course has more.

The majority of graduate students depend on teaching or research assistantships, with stipends ranging from about $5,000 to just over $8,000 for half-time appointments. A constructive step that would aid in the recruitment of superior students from out-of-state would be for the ABOR to waive resident tuition as well as non-resident fees, as the majority of state universities do. At present a non-resident graduate student who is awarded a merit-based teaching or research assistantship must pay $1,200 annually in registration fees, effectively lowering the average stipend from $6,700 to $5,500. In many cases, a teaching assistant must teach four courses annually for this sum. The lack of married student housing at ASU is also a district disadvantage for graduate students with limited resources.

If we think that the Arizona universities are currently in a growth stage qualitatively as well as quantitatively, there are some sobering indications in the list of National Science Foundation awards for graduate study in the natural and social sciences, mathematics, and engineering. Of the 685 fellowships awarded for 1988-89, four went to baccalaureate graduates of Arizona universities -- one from UA, two from NAU, and one from ASU (who will continue at ASU). Three graduates of other universities have chosen to pursue graduate degrees in Arizona under the same award program -- two at UA in earth science and in experimental psychology, one at ASU in organic chemistry. Thus UA and ASU will each have two NSF Fellows pursuing graduate degrees, and NAU will have sent two NSF Fellows out of state. Even with such skimpy data, it seems apparent that the two larger universities did not do too well, that their graduate programs drew twice as many NSF Fellows as their undergraduate programs produced, and that NAU has reason for pride in the quality of its undergraduate preparation.

EMPLOYMENT OF ADVANCED DEGREE RECIPIENTS

Large universities do not do an especially good job of tracking their advanced degree graduates. Alumni associations do so for fundraising purposes and periodically publish brief summaries of personal or professional accomplishments, very ephemeral in nature. Departments or particular individuals in departments often have an informal record of where their advanced-degree recipients have gone and what they have done. Annual efforts try to identify alumni whose achievements merit recognition, and decennial reviews usually include sections on the professional success of program graduates. New means of information storage and retrieval should improve the process of keeping track.

The limited data provided by our survey of 1976 and 1986 doctoral graduates indicated that these groups held markedly favorable opinions about the quality of their academic preparation and their ability to compete professionally. The information provided by answers to the salary question reinforced the general impression of their professional competitiveness. The graduate colleges, however, have not systematically kept track of advanced degree recipients and generally depend on departments to supply such information when it is needed.

A higher proportion of master's degree receipients remain in Arizona than do doctoral recipients. Whether this has a bearing on competitiveness is not clear. Doctoral graduates generally face tougher competition in the positions they apply for, and the majority of those who go into university teaching apply for jobs out-of-state. In a survey of 1985-86 doctoral graduates at UA, a group numbering 261, just over one-third planned to remain in Arizona. They listed their employers as follows:

University of Arizona	16.8%
Other colleges and universities	32.2
Foreign academic institutions	2.1
Medical schools	1.4
Community colleges	2.1
Elementary or secondary schools	7.7
Foreign governments	2.8
Federal government	5.6
Industry	17.5
Self-employed	8.4
Other	3.5

Since it is not customary for Arizona universities to hire their own doctoral graduates on a permanent basis, it is likely that the high number listing UA as their employer held post-doctoral research appointments, ranging from several months to three years.

ASU provided a summary of employment for advanced degree recipients of six departments undergoing review. The group surveyed had received master's degrees or doctoral degrees between 1980 and 1986:

Department	Count	Number & Percentage Remaining in Arizona		Sampling of Arizona employers
Chemistry	76	31	40.8%	Unidynamics, Talley Defense, Honeywell, Motorola, ASU
Civil Engineering	69	47	68.1%	Garrett, US Army Corps of Engineers, Dept. of Transportation, Bechtel
History	56	41	73.2%	UA, AZ Dept. of Health, Tempe and Phoenix high schools, The Onyx Press
Physics	27	8	30%	NA
Spanish	26	18	69.2%	Area schools and ASU
Zoology	58	28	48.3%	AZ Dept. of Health, Maricopa Community College District, Phelps Dodge, area schools

The number remaining in-state and contributing their skills and intelligence to the local economy and community is extraordinary high -- more than 55% of advanced degree recipients.

NAU could offer a cumulative enumeration of alumni by profession and some anecdotal information from a few departments. Since so many advanced degree recipients were already established in educational careers, an even higher percentage may remain in Arizona.

Because such a high percentage of graduates with advanced degrees remain in Arizona, the state stands to benefit from the quality of their contribution. If the universities attract superior graduate students and if high quality faculty direct their work, the likelihood of more productive and creative research is strengthened. If superior students are drawn to our graduate programs, the state will retain better quality professionals. In addition to these relatively short-term benefits, long-term benefits also exist: superior graduate students are more likely to address more important research problems that result in improved crop yields, new treatments or cures for diseases, new ways of studying the physical universe, or better approaches to social problems.

PROGRAM ASSESSMENT AND QUALITY CONTROL

Issues of quality control are addressed at several stages by different agencies of the Graduate College, the academic unit offering the degree program, or by the Graduate Council or Graduate Committee, an appointed and broadly representative faculty group with special responsibilities for graduate education. Both the Graduate College and the academic unit set standards and requirements for admission; the academic unit sets specific course requirements and evaluates the students' progress; the Graduate College sets requirements for theses and dissertations and appoints a representative to evaluate the dissertation and to observe and report on the quality and conduct of the oral defense; and the dissertation itself reflects the direction and suggestions of a faculty supervisor and a committee of from two to four additional faculty members. At each university members of the Graduate College staff monitor the departmental procedures, the student's progress toward completion of all requirements, and the format of the culminating project.

Each of the Graduate Colleges requires a periodical review of academic degree programs, on a ten-year cycle or more frequently if possible. At UA the process involves three levels of review: self review by the unit, university review, and outside review by highly qualified individuals in the appropriate discipline. This process provides the information necessary to obtain a true picture of the strengths and weaknesses of departments or programs. If the program is no longer relevant, if the faculty and resources are inadequate to support a program, or if student participation is too low, termination of the program may be recommended. However, some excellent programs may be of such limited interest that relatively small student populations are to be expected; thus size alone is not a sufficient reason for termination.

The process of review and assessment considers many indices of quality: national and international awards to faculty or to present and former students, external funding for research, election to significant scholarly and scientific academies, participation in national panels or review boards for research awards, and service on editorial boards or in the activities of major national and international professional associations. Presumably, any recommendation for termination of a degree program would consider these indicators of quality as well as student population and degree productivity.

The UA Graduate College is also an active participant in the program review process and follow-up measures. On completion of the review, a plan is developed to improve the program where weaknesses exist. The Graduate College helps determine the goals in this plan and monitors the progress toward meeting these goals. In those cases where the review process results in a recommended termination, the Graduate Council and ultimately the Graduate College bear special responsibility.

A summary of graduate program changes at UA over the past decade suggests a good deal of self scrutiny. Most of the changes are name changes in keeping with professional currency. Other categories of change include programs discontinued, for example the M.S. in Addiction Studies and the M.Ed. in School Library Science; programs divided, for example Romance Languages into Departments of Spanish and Portuguese and of French and Italian; and programs combined, for example Physiology and Animal Physiology into a single department or the M.S. and Ph.D. in Molecular Biology deleted and combined with M.S. and Ph.D. in Cellular and Developmental Biology to form a department and major in Molecular and Cellular Biology. Of course some new programs were added: a Department of Classics, indicating that potentially high enrollment was not a crucial concern, and such interdisciplinary programs as Bioengineering, Biophysics, and Insect Science, indicating that current research opportunities were, quite properly, a concern.

At ASU, where the Graduate Council plays a prominent role in setting policy and conducting the review process, an effort is underway to accelerate the review cycle by instituting an interim review mid-way through the ten-year period. Thus, in an effort to improve program quality and to monitor progress, each program will be reviewed every five years. Furthermore, decennial reviews of graduate programs will be scheduled insofar as possible in advance of accreditation reviews by the North Central Association or by accrediting agencies linked to particular professional associations. Ideally the decennial review should identify any areas of weakness and permit corrective action to begin before a scheduled accreditation review.

The main objective of the decennial reviews has been to provide the ABOR and the ASU administration with comprehensive information about academic units and their degree programs. In a rational sequence of reviews the decennial review would help a unit prepare for accreditation reviews, the objectives of which are to determine whether programs meet national professional standards and deserve the measure of credibility that successful accreditation conveys. The interim reviews conducted by the Graduate Council have the main objective of monitoring the progress and improvement of units in areas identified by the decennial and accreditation reviews. Taken together, these program reviews can effectively inform institutional planning, help maintain and enhance program quality, direct resources to the best programs, and stimulate constructive action at the department and college level.

New programs dominate the summary of program changes over the past decade, suggesting the rapid growth of the institution in many regards. Other changes include the renaming of departments or programs; splitting departments into separate entities as their growing maturity justifies, for example Botany and Microbiology; and "disestablishing" programs and departments for more efficient utilization of resources. Among the programs deleted at ASU are master's degrees in

Child Drama, Community Education, and Agriculture. The College of Education has undergone numerous and major reorganizational changes as seven departments were transformed into three divisions, Ph.D. programs in Secondary Education and Social and Philosophical Foundations terminated, and four Education Specialist degrees deleted: Counselor Education, Elementary Education, Higher and Adult Education, and Secondary Education, New interdisciplinary programs are fewer than at UA, but still evident in such examples as the Ph.D. in Science and Engineering of Materials, which joins faculty and resources from the Colleges of Engineering and Liberal Arts and Sciences.

NAU is in the midst of its second university-wide review of all graduate programs since 1981. The review, which involves a stage of self study by the academic unit, a stage of further examination and critique by a faculty committee from other academic units, and a stage of evaluation by consultants from outside the institution. The objective of this review process is to identify programs of high quality and programs with problems that need concerted attention. The mechanism for launching this review is the appended questionnaire.

In many cases this internal review will be preparatory for a decennial review or an accreditation report; in some cases it may be subsequent to one of these formal reviews. In either case, it would offer a means of assessment that identifies strengths and weaknesses or a means of measuring progress toward stipulated goals and program improvement.

Program changes during the past decade are quite evenly balanced between deletions and additions. Deletions include M.A.'s in Business Education, Home Economics Education, Industrial Education, Teaching English, Teaching Social Science, Music Education, Art Education, and Criminal Justice. In addition five Education Specialist programs were deleted: Guidance and Counseling, Elementary Principalship, Secondary Principalship, Superintendency, and Supervision. Programs added, all at the Master's level, include Clinical Speech Pathology, Bilingual/Multicultural Education, Public Administration, Counseling Art, and Quaternary Studies. The pattern indicates a maturing graduate program keyed to student and state need and aware of faculty strengths and regional resources.

INCENTIVES RELATED TO QUALITY

In most cases special recognition of faculty efforts to do well at what they have chosen to do might seem superfluous. There is inherent pride in teaching well at the undergraduate and graduate levels; there is additional satisfaction in directing graduate students and launching them on their professional careers; and there is a special gratification in seeing them independently established and professionally recognized. Ultimately, they are important means for establishing the reputation of individual faculty members and of the institution itself. Special recognition for those who perform well in teaching and directing graduate students emphasizes an institutions values and strengthens the morale of its faculty.

For these reasons all three Arizona universities try to establish a reward system that recognizes the quality of graduate teaching and the direction of theses and dissertations as contributions furthering the institutional mission. Promotion, tenure, and merit determinations at all three universities are based in part on the individuals's involvement in graduate instruction. All three universities have special awards which may recognize excellence in graduate as well as undergraduate teaching.

Even apart from these forms of institutional recognition, there are important incentives that draw faculty members to graduate teaching: the opportunity to teach more advanced subject matter to more advanced students in smaller classes with opportunities for greater interaction. Graduate education is in many areas more closely allied to research, and directing graduate students can accelerate the professor's own research. And, as implied earlier, the quality of one's involvement and the success achieved is a factor in peer recognition -- an important if less tangible incentive.

Apparently only ASU has gone a step farther in increasing peer recognition and institutional regard for outstanding teaching and direction of graduate students. The Graduate College and the ASU Foundation, in recognition of the institution's first 50 years of graduate education, have established an annual award for outstanding graduate mentors. For the first year, three faculty members in three distinct academic areas were honored, and their views of graduate education published in a form that illuminates the characteristics and differences in graduate education in the humanities, sciences, and teacher training. Even more tangible recognition is conveyed by ASU's Distinguished Research Awards, which free outstanding researchers from classroom duties for a year and enable them to concentrate on research and the direction of graduate students. These awards are patent incentives and worthy of broader transfer and adoption.

CONCLUSION AND RECOMMENDATIONS

- Periodic surveys of advanced degree recipients can convey important information to the Graduate Colleges. Surveys of those who do not complete degree programs might contribute contrasting information or suggest measures to increase retention and completion.
- A survey of doctoral graduates of all three universities indicated strong approval of the quality and relevance of graduate programs and of the procedures and requirements that support them.
- They deemed the quality of direction and supervision very high but committee involvement significantly lower, suggesting that Ph.D. committees might function more efficiently with three rather than five members.
- Graduate College staff were generally perceived as helpful in all three institutions, but a lower rate of approval at UA would seem to justify some closer attention and improvement.
- The financial hardships reported by advanced degree recipients warrant closer attention to maintaining the competitive level of stipends for teaching and research assistants and the desirability of waiving resident

MISSION DEVELOPMENT AND STRATEGIC PLANNING

tuition fees to raise the stipends.

- Each university has taken steps to increase minority representation in graduate programs. ASU has launched the most innovated and multi-faceted plan. Although it is too early to discern any results, the operation of the plan should be watched closely to see whether aspects of it might be adapted to the other universities.

- Efforts to recruit superior graduate students should not slacken. They are attracted to research-active departments which can offer sufficiently competitive scholarships and assistantships. In these areas none of the Arizona universities is sufficiently competitive.

- Graduate program review and assessment are essential to building and maintaining quality. For best advantage the cycle of decennial reviews, accreditation reviews, and interim reviews should be planned to facilitate program development, progress, and improvement. Reviews should also be effectively utilized in institutional planning.

- Although the reward system at all three universities recognizes the positive value of a faculty member's contributions to graduate education, only ASU has made a concerted attempt to reward its most productive researchers and its most outstanding graduate mentors. These awards dignify an important area of educational activity and merit consideration by the other institutions.

APPENDIX

The Status of Research Activity at Arizona's Universities,
Marvin Fisher, June 1988

University Research and Economic Development in Arizona Today,
Marvin Fisher, June 1988

THE MISSIONS AND STRATEGIC PLANNING OF ARIZONA'S UNIVERSITIES

ROBERT MACVICAR

The earliest beginnings of higher education in North America during the colonial period were institutions that had a specific mission. Harvard University was created to provide for the education of an indigenous clergy to replace those imported from England, and Princeton had the same purpose for Presbyterian divines. The advent of public universities such as the University of Georgia (1785) and Mr. Jefferson's University of Virginia (1819) created a second category of institution with the mission of preparing young men for professions such as law and public service. During the early period of the Republic, most eastern states established one or more public universities, each with a reasonably well-defined mission and a strong commitment to the traditions of Oxford and Cambridge.

By the mid-nineteenth century there was growing recognition that a rapidly industrialized nation needed different institutions of higher learning. In 1862 the United States Congress created the Land-Grant Colleges. These institutions had a relatively clear mission statement: "at least one college where the leading object shall be, without excluding other scientific and classical studies including military tactics, to teach such branches of learning as related to agriculture and the mechanical arts -- in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

The growing demand for teachers in the schools of a young nation led to the creation of the Normal Schools and Teachers' Institutes in the latter half of the nineteenth century.

More specialized public institutions began to emerge such as Georgia Institute of Technology, the public black colleges under the "separate but equal" doctrine, universities created and funded by cities rather than states, schools of mines in the West (Montana, Colorado, South Dakota, New Mexico), military institutes (Virginia, South Carolina), free-standing institutions of the health professions (California and many other states). The remarkable complexity of higher education in the United States was apparent by the end of the nineteenth century. In all but a few states in the sparsely populated western United States, more than one public institution had been established and the issues of mission clarity and duplication of programs began to emerge.

Robert MacVicar, President-Emeritus of Oregon State University served as the chief executive of that institution during 1970-1984. He previously was Chancellor of the Southern Illinois University at Carbondale and Edwardsville, Vice-President for Academic Affairs, Dean of the Graduate School, Head of the Department of Biochemistry and Professor of Chemistry at Oklahoma State University. He holds degrees from the University of Wyoming (BA), Oklahoma State University (MS), and the University of Wisconsin. He has authored numerous publications in his professional area of biochemistry and nutrition. He has served on numerous national committees and as a consultant to state, national and international organizations in the field of higher education. He has served as Executive Director of the Task Force on Excellence, Efficiency and Competitiveness.

During the continual growth of the nation, many of these institutions expanded their original missions to become more comprehensive. Local normal schools became regional state colleges and then universities (in name, if not in function). Competition for resources led legislatures in many states to seek means to achieve better coordination of their respective complex of institutions of higher education. Statewide boards of governance or coordination were created, disbanded, recreated, a process that continues to the present. Almost always, a primary motivation was to achieve more precise statements of institutional mission and avoid unwarranted duplication of programs. Countering these efforts were institutional aspirations to broaden the scope of their programs and extend the level to graduate status. In these efforts they were supported by local interests who saw economic benefit from expanded offerings and by alumni who correctly perceived that the value of their degree was to some extent related to the status of the university that granted it.

Thus the issue has been joined in state after state between the centrifugal forces of institutional aspirations and community "boosterism" and the generally weaker centripetal forces of legislative admonition, gubernatorial expressions of concern about the waste of duplicated programs, and the often-limited power or will (or both) of the coordinating agency.

Yet institutions of higher education must have a clear sense of their mission if their planning for the future is to be realistic. Moreover, resources are always finite and no university can expect to do everything. In states of modest size and resources, these constraints become more limiting; the urgency of clear and explicit directions on what is within the role, scope, and function, and perhaps of greater importance what is not, are greater. Arizona, for the forseeable future, is likely to remain in the middle third of the rank order of states in population. Likewise, it seems unlikely that the per capita income level will exceed the national average; it is currently.

Let us examine in more detail the history of statewide planning for postsecondary education in Arizona. During much of the past century, Arizona grew slowly with an economy based largely on natural resources -- agriculture and mining. In the 1950's, however, numerous "high-technology" industries developed or moved to the two main metropolitan areas. This growth imposed on each of the three institutions the expressed need for access to undergraduate, professional, and graduate educational opportunities. During the phase of slow growth, the character of the three universities appears to have been guided by an implicit understanding of the mission of each one. The University of Arizona was the Land-Grant university with a historic commitment to the Liberal Arts and Sciences, Mining, Agriculture and Engineering. The colleges in Tempe and Flagstaff were primarily teacher education institutions at the baccalaureate and master's levels. As growth accelerated following WWII, each became more comprehensive. The University of Arizona expanded its graduate-level instruction and its research function. Arizona State College at Tempe began to assume the character of a comprehensive research university, adding doctoral-level studies in numerous disciplines in the 1960's and early 1970's. It became a university in name as well as in function in 1958. The institution in Flagstaff expanded its scope to include programs in business, engineering and forestry, and assumed the university title in 1966.

In the early 1960's, Arizona began to develop a system of community colleges. The Maricopa Community College District is one of the largest of its type in the nation. This system now shares with the three universities a significant share of the lower- division instruction. The districts are under the control of locally elected boards and supported in part by local tax funds. Navajo Community College is a quasi-private college serving primarily the Navajo Reservation.

During the period before 1946, such coordination as occurred seems to have been achieved by legislative admonition and the strong influence of the University of Arizona and its partisans. In 1946 the Board of Regents became the governing body of all baccalaureate-level higher education. The opportunity for coordination and planning for essentially all postsecondary public higher education became a possibility. This was not the tradition, however, and for many years the Board in reality consisted of sub-boards, each of which related to one of the three institutions. This pattern was supported by the practice of submitting three separate budgets, one for each of the institutions, a practice that continues to the present. A long-range planning document adopted in 1974 is characterized by statements of what the Board would not do to limit university aspirations and a long list of institutional program additions at the departmental level that each university sought to add during the five-year planning period, 1974-79.

Following 1974-79, the Board revisited some of the planning issues and agreed that "the increasing size and complexity of the institutions of the Arizona University System coupled with growing societal demand upon universities make it imperative that the mission and scope of each university be clearly delineated and understood." A subcommittee of the Board developed, with the assistance of "key university administrators and the Board's staff," the mission and scope statements for the three universities and a proposed Westside campus in Maricopa County. These statements were to be "the fundamental planning document of the Arizona University System and will provide guidance for the development of budgets, programs and other activities of the universities." The mission and scope of each of the four institutions were presented as a "profile" with the following components:

- o Type of Institution
- o Degree Levels Offered
- o Enrollment Limits
- o Physical Plant
- o Continuing Education Responsibilities
- o Academic Degree Programs

A detailed examination of the four profiles reveals that in a number of relatively noncontroversial aspects there is a substantial degree of specificity, i.e., degree levels offered, single or multi-campus university, and continuing educational responsibilities. In other aspects such as "type of institution," however, the following guidance is provided:

- University of Arizona

Continue as a major, comprehensive research university, competitive with the best public universities in the nation.

- Arizona State University

Continue development as a major research university, with special emphasis on programs needed in the state's major urban area. Become competitive with the best public universities in the nation.

- Northern Arizona University

Maintain excellence as a teaching institution while developing special research and public service roles relating to northern Arizona and the Indian tribes. Be competitive with the best institutions of its type in the nation.

In the area of enrollment limits, the following statement is common to all three universities:

> "The Board will continue to consider the question of campus enrollments, keeping in mind the various factors that bear on this question: the size of the institution's physical plant, the resources available and the philosophy of access to higher education to the citizens of the State of Arizona. The university's ultimate size shall be compatible with its goals for academic excellence. Care will be taken to insure that any enrollment limits will not disproportionately impact minority students nor hinder affirmative action plans."

In the profile dealing with academic programs, the emphasis is entirely on positive development and contains no limits or constraints except those that might be inferred by omission.

Overall, the document represents a compilation of the aspirations of the faculties and administration of each university rather than a clear statement both of appropriate scope and explicit limits. Only minor modifications occurred in the mission aspects of a document issued in 1981 and a third dated 1982-83. The five-year planning projection was modified as additional programs were approved for planning and proposed programs were implemented or withdrawn.

Subsequent efforts to develop more precise mission and scope statements by joint efforts of Regents' staff and university Presidents and their staff have been influenced by the decision to develop strategic plans for all the institutions. Institutional competitiveness and concern for the potential for exclusion from disciplines, program areas, or degree level have resulted in documents that repeat the same "aspirational" and expansionistic language found in the earlier Profiles. Indeed, to a substantial degree, the most recent documents echo the statements of the 1980 profiles: "major, comprehensive, be or become competitive with the best."

Such statements might be regarded as relatively harmless if they did not result in distortion in the allocation of scarce resources:

- first, by the Regents in their role as representatives of the people of the state who in the final analysis created, developed and now sustain the three universities.
- secondly, by university administrators who allocate resources in an attempt to achieve an inappropriate or unrealistic objective but neglect the existing needs of undergraduate students, underserved segments of the population and essential support services.

A too broadly defined scope inevitably dilutes resources and prevents a focus on the most important roles that the institution has to meet for the needs of the state. Offering programs, particularly if they are duplicated, at the graduate and especially the doctoral level may result in weakening already existing program by dividing the prospective students.

A fundamental issue that must be faced by any state that seeks to develop a coordinated system of higher education is the development of a statewide mission document which defines the needs to which the system will respond. In states with a substantial component served by independent colleges and institutions, their contribution to meeting the collective needs must be recognized. However, the coordinating board must recognize its limitation in controlling the independent sector and limit its activities to an advisory role. It may, however, provide direction to the public-sector institutions and avoid actions that would have a deleterious impact on those in the private sector. This issue is of less importance in Arizona, but in developing the Glendale campus of ASU the Board of Regents should be sensitive to actions which might negatively affect Grand Canyon University. The ASU-West campus should develop cooperative relations with Grand Canyon and the American Graduate School of International Management, particularly in areas of library services. Indeed it has already begun to do so.

The statewide mission document should also recognize the availability of educational programs in other regional states, particularly those with which Arizona is affiliated in the Western Interstate Commission for Higher Education. The Commission created by this intergovernmental agreement has for many years served to facilitate transfer of students across state boundaries and to provide access to programs not available in one or more states of the region. Arizona participates in this program at the professional level by providing opportunities in dentistry, veterinary medicine, optometry, osteopathy and occupational therapy programs. WICHE has recently increased its efforts to effect exchange in graduate programs of limited demand. Currently Arizona universities do not participate in this exchange.

Ultimately, however, the statewide mission statement must deal with the issue of what programs will be offered in Arizona, which ones will require more than a single offering by the system, and which of the institutions will be designated to offer the program or programs. In summary, the following questions will be addressed and answered:

- What programs will be offered?
- By whom will programs be offered?
- Where will programs be offered?
- When will programs be offered?

In developing the individual mission of each university, the Board must achieve a balance between the present needs of the state to avoid unnecessary duplication and the potential demand in the state, the population of which will continue to grow somewhat more rapidly than the national average for the next several decades. The Board has maintained the policy of granting planning authority for new programs; as of June 30, 1988, 36 such authorizations were in force. In the absence of a strategic plan for the system, these authorizations have largely been in response to institutional initiatives. Without the constraints of well-defined mission statements for each of the universities, these requests for planning authority have largely represented departmental or faculty group initiatives. In numerous instances, the planning requests do not appear to re-enforce areas of emphasis and duplicate programs offered elsewhere in the system at the master's or doctoral levels.

In the past several years the Regents have tried to develop plans based on a longer time horizon. With a staff addition in July, 1987, having primary responsibility for strategic planning, efforts have begun to develop more precise mission statements for each of the universities, including the branch campus of ASU in Glendale. The institutional response, in the absence of guidelines from the Regents, has tended to be quantitative (expansion in scope and level) rather than qualitative (enhancement of existing programs, particularly those designated in the 1981-83 documents as appropriate for "national recognition").

Experience in other states leads to the conclusion that the development of restrictive mission statements by institutional leadership is unlikely to occur. In several states which have recently developed long-range plans, the missions of elements of the system have been defined by coordinating boards or, in one instance, by an act of the Legislature (Colorado). California recently completed a review and revision of its "master plan," using an external citizen task force. This document, as an example, reaffirmed the previous master plan in limiting doctoral granting authority to the University of California system.

Recent efforts by the Arizona Board of Regents' staff and the universities to produce more definitive mission statements have, thus far, been less than productive. With the exception of the Glendale campus of ASU, the proposed statements are inclusive rather than exclusive and continue to focus on institutional aspirations rather than on thoughtful reaction to the present and projected needs of Arizona.

In reaction to this situation, the Strategic Planning Council (composed of the Regents' planning and academic staff, the Academic Vice-Presidents of the three universities, and other university representatives) has turned to an effort to achieve agreement on the mission of the system. They have had several meetings from which an Arizona University System Mission document is emerging. While there has been, and doubtless will continue to be, disagreement, particularly with respect to elements of the mission which are exclusive, the process has led to a better understanding of the aspirations of the individual universities. The limits of the system to support unnecessary duplication of academic programs has become better understood. The long-standing commitment to providing access to high-cost postbaccalaureate professional degree programs (e.g., veterinary medicine, optometry, osteopathic medicine, occupational therapy) by the WICHE program has been reaffirmed. Recognition has been given to the needs of the nonmetropolitan areas of the state that will continue to contain between 20 to 25 percent of the total population and a slightly higher fraction of the traditional college age population.

At some appropriate time, closure on the AUS mission statement should be reached even if there is no consensus, and the alternatives presented to the Council of Presidents for refinement and further development. This review might result in modification of the proposal or its return to the Strategic Planning Council with instructions on how to proceed. At some time, as the Council of Presidents approves a revised AUS mission statement, or if it also is unable to attain consensus and develops alternative components, the document should be referred to the Regents.

Because the AUS mission document is such an essential element in the planning process, the Board should discuss the proposals as a committee of the whole. It would also be appropriate to allow ample time between initial consideration and subsequent hearings when testimony would be received from interested clientele: students, representatives of business, industry and government, and the general citizenry. Ultimately what is sought is a document capable of providing guidance to the representative campuses in developing their own mission statement. The time span envisaged for the statement should be of reasonable duration based on the realization that highly accurate long-range assumptions on the environment in which the system and its individual components will operate cannot be made. Hence it should be expected that the strategic-planning process will be revisited periodically at the system level. At the time of review and revision, there will be need to examine the system mission statement and planning guidelines and make such revisions as changing circumstances make necessary.

In its efforts to create mission and scope statements for the then three universities and the proposed westside Phoenix campus of ASU, the Regents asserted:

"The clear definition of each institution's mission and scope is the very cornerstone of any rational planning process in a university system. Well-defined institutional mission and scope statements are vital for the provision of an effective and efficient system of higher education in the State ofArizona as they:

A. Promote access to higher education by insuring that opportunities for all qualified citizens are available;

B. Enhance the diversity of campuses and programs by identifying their unique characteristics and avoiding tendencies for universities to become more-and-more like each other;

C. Improve quality by establishing missions that discourage the lowering of academic standards in the period of possible competition for students;

D. Insure economy by reducing the potential for unnecessary program duplication;

E. Promote credibility by providing each public segment and institution with a realistic and explicit set of expectations about its future program emphases; and

F. Promote public understanding of higher education by illustrating for students, the general public, and state officials the pattern and logic of the missions and programs of the institutions so that they may have a better basis for making choices."

In the five years since these policy statements were made, significant environmental changes have occurred and the institutions have continued their development. The ASU Westside campus has been brought "on-line" at its permanent site and funds for Phase I of the physical plant development were approved. It would be timely when the AUS mission and scope statement is submitted to the Board for review and ultimate action to also review these broad policy assertions, make modifications as necessary, and adopt the revised statements as basic guidelines to the individual elements of the system as they proceed to develop their own mission and scope statements.

One environmental factor that has significantly changed in the past decade, largely as a result of the concern for the state tax burden, has been the gradual erosion of the tax base when compared with the demand for public services by a state of rapid population growth. Competition from the state human services agencies has increased and it is anticipated this will continue. As a result of this situation, the focus of each university may need to be more circumscribed than would have been the case in an earlier period.

There is probably no more important task for the Board of Regents than to provide guidance to the individual elements of the system as they continue to provide instruction, research, and service to a broad international constituency. By the development of a well-articulated system mission and scope statement and subsequent statements for the four principal elements of the system, the limited resources likely to be available for the foreseeable future can be focused to maintain both the quality of the programs provided and their accessibility to a growing population and to elements not now participating fully.

ARIZONA ENVIRONMENTAL SCAN STUDY

JACK BARTRAM AND MELINDA GEBEL

An "Environmental Scan" consists of collecting information that relates to the "environment" in which an institution operates. While it primarily focuses on external trends and conditions, in this case it also included internal trends of the Arizona universities. This study was contracted by the Task Force to Bartram and Gebel and was based on an independent assessment of existing data from multiple sources. All data were entered into a microcomputer based spreadsheet, with calculations performed in some cases and direct display of the original data in others cases; the results were then printed as graphs (one per page) and included the reference data citation. The resulting 300 figures were presented in four chapters. These chapters are:

Chapter	Title
I	Population and Demographics in Arizona (73 Figures)
II	The Economy and the Jobs in Arizona (28 Figures)
III	Arizona K-12 Public Education (50 Figures)
IV	Arizona Higher Education; Part A (68 Figures) Part B (81 Figures)

Jack Bartram is a retired Vice President from the University of Colorado and works with the National Center for Higher Education Management Systems as well as working as a private consultant.

Melinda Gebel is a Research Analyst in the Office of University Institutional Research at Arizona State University.

The complete 13-page listing of the Table of Contents for these 300 figures is attached to this summary. Paper copies of the figures and disk copies of the files were provided to each Arizona university and the Board of Regents office; the full listing of original data resided with the Task Force until completion of the study and then was transferred to the Board of Regents.

The results of this study were used as background information for the various working papers developed by the Task Force staff. Copies of the study were provided to the universities as soon as they were available.

TABLE OF CONTENTS

Chapter I -- Population and Demographics in Arizona

MAP 1.01 State Map
  MAP1 .01 State Map of Counties and Major Cities

AZPOP 1.02 Historical and Projected Population in AZ by Data Source--1970 to 2000 (5-Yr Intervals)
  AZPOP1 .01 Arizona Population Trends
  AZPOP2 .02 Population Projections Compared to Census--1970s Projections
  AZPOP3 .03 Population Projections Compared to Census -- 1980s Projections

TRENDS 1.03 Population Trends by Age Group in Arizona--1970, 1985, and 2000
  TRENDS1 .01 Population Changes in Five-Year Age Groups
  TRENDS2 .02 Change in Population by Age Group, 1970 to 1985
  TRENDS3 .03 Change in Population by Age Group, 1985 to 2000
  TRENDS4 .04 Population by Age Group and Gender, 1985

POPCHG 1.04 Components of Population Change in Arizona--1970 to 2000
  POPCHG1 .01 Births and Deaths
  POPCHG2 .02 Natural Increase and Net Migration
  POPCHG3 .03 Percent Annual Population Change

MIGRATE 1.04 A Arizona Migration Flows for the Top Ten States--1980/81 to 1984/85
  MIGRATE1 .01 Migration Flows to and from Arizona
  MIGRATE2 .02 Migration Flows for the Top Ten States
  MIGRATE3 .03 Net Migration for Leading Western States
  MIGRATE4 .04 Net Migration for Leading Eastern States

ECONMGR 1.04 B Arizona Net Migration Compared to Annual % Change in AZ GSP and US GNP--1970 to 1984
  ECONMGR1 .01 Annual Percent Change in AZ GSP and US GNP
  ECONMGR2 .02 Arizona Net Migration
  ECONMGR3 .03 Arizona Net Migration (as % of Population) and % Change in GNP
  ECONMGRD .04 Characteristics of In-Migrants to Phoenix and Tucson Areas, 1975 to 1980

METPOP 1.05 Resident Population and Household Income in Maricopa Co by Region--1980 to 2000
  METPOP1 .01 Population Growth--1980 Base with 5-Yr Growth Intervals to 2000
  METPOP2 .02 Percent Change in Population, 1985 to 2000
  METPOP3 .03 Projected Population, Year 2000
  METPOP4 .04 Average Household Income, 1985
  METPOPE .05 Map of Phoenix Metropolitan Regions with ASU and ASU West Service Areas

ETHNPOP	1.06	Population Distribution by Ethnicity--Arizona, Maricopa, and Pima County, 1980
ETHNPOP1		.01 Population Distribution in Arizona
ETHNPOP2		.02 Population Distribution in Maricopa County
ETHNPOP3		.03 Population Distribution in Pima County
AGEUS	1.07	Population by Age Group in the United States and Arizona--1985 Estimates
AGEUS1		.01 Percent of Population by Age Group
ETHNAGE	1.08	Population by Age Group and Ethnicity in Arizona--1980
ETHNAGE1		.01 Percent of Population by Age Group--Total and Spanish Origin
ETHNAGE2		.02 Percent of Population by Age Group--Total and Black
ETHNAGE3		.03 Percent of Population by Age Group--Total and American Indian
ETHNAGE4		.04 Percent of Population by Age Group--Total and Asian
ETHNAGE5		.05 Percent of Population by Age Group--Total and White
ETHNAGE6		.06 Ethnic Composition of 0 to 4 Age Group
POPAGE	1.09	Population by Age Group for Arizona and Arizona Counties--1980
POPAGE1		.01 Percent of Population by Age Group--Arizona and Maricopa County
POPAGE2		.02 Percent of Population by Age Group--Arizona and Pima County
POPAGE3		.03 Percent of Population by Age Group--Arizona and All Other Counties
METRO	1.10	Percent of State Resident Population in Metropolitan Areas--1984
METROA		.01 Percent of Population--Ranked by Percent
YRSSCH	1.11	Years of School Completed in Arizona and Selected Western States--1980
YRSSCH1		.01 Percent of 25+ Age Group who High School Graduates
YRSSCH2		.02 Percent of 25+ Age Group with 4+ Years of College
YRSSCH3		.03 Percent of 25+ Age Group who are HS Graduates in Arizona by Ethnicity
YRSSCH4		.04 Percent of 25+ Age Group with 4+ Years of College in Arizona by Ethnicity
YRSSCH5		.05 Percent of 18-24 Age Group who are HS Graduates in Arizona by Ethnicity
INCOME	1.12	Family and Per Capita Income by Ethnicity--US and Arizona, 1979
INCOME1		.01 Percent of Population by Family Income
INCOME2		.02 Per Capita Income by Ethnicity
INCOME3		.03 Median Family Income by Ethnicity
INCOME4		.04 Percent of AZ Population by Family Income--Total and Black
INCOME5		.05 Percent of AZ Population by Family Income--Total and Asian
INCOME6		.06 Percent of AZ Population by Family Income--Total and American Indian
INCOME7		.07 Percent of AZ Population by Family Income--Total and Spanish Origin
INCOME8		.08 Ethnic Distribution of Persons with Incomes less than $10,000 in AZ
INCOME9		.09 Ethnic Distribution of Persons with Incomes between $10,000-$35,000 in AZ
INCOME10		.10 Ethnic Distribution of Persons with Incomes greater than $35,000 in AZ
MEDINC	1.13	Median Family Income in Arizona Counties and Maricopa County Cities/Towns--1979
MEDINC1		.01 Median Family Income
MEDINCB		.02 Median Family Income by County--Ranked by Median Income
MEDINCC		.03 Median Family Income by City/Town in Maricopa County--Ranked by Median Income

INDEX	1.14	United States Consumer Price Index--1967 to 1986
INDEX1		.01 US Consumer Price Index--Base Year 1967
INDEX2		.02 US Consumer Price Index--Base Year 1979
POPCTY	1.15	Population and Change in Population in Arizona Counties, 1980 and 1985
POPCTYA		.01 Population in Arizona Counties--Ranked by Population Size
POPCTYB		.02 Change in Population in Arizona Counties--Ranked by Absolute Change, 1980-1985
POPCTYC		.03 Change in Population in Arizona Counties--Ranked by Percent Change, 1980-1985
POPCTY4		.04 Population of Major Arizona Counties--1985
POPCTY5		.05 Population of Major Arizona Counties--2000
AZCITY	1.16	Population and Change in Population in AZ's 50 Largest Incorporated Places--1980 and 1985
AZCITYA		.01 Places with Populations Greater than 5,000--Ranked by Population Size, 1985
AZCITYB		.02 Places with Populations Greater than 5,000--Ranked by Absolute Change, 1980-1985
AZCITYC		.03 Places with Populations Greater than 5,000--Ranked by Percent Change, 1980-1985
MARCITY	1.17	Population Growth and Distribution in Maricopa County by Location--1980 to 1985
MARCITYA		.01 Population Growth by Location--Ranked by Absolute Change, 1980-1985
MARCITYB		.02 Population Growth by Location--Ranked by % Change, 1980-1985
MARCITYC		.03 Population Distribution by Location--Ranked by % Black, Asian, Native Am, 1985
MARCITYD		.04 Population Distribution by Location--Ranked by % Spanish Origin, 1985
MARCITYE		.05 Population Distribution by Location--Ranked by % Under Age 18, 1985
MARCITYF		.06 Population Distribution by Location--Ranked by % Over Age 64, 1985
PERCOLL	1.18	Percent of Persons 25 Yrs & Over with 4+ Yrs of College--AZ & Selected Counties, 1980
PERCOLL1		.01 Percent of 25+ Age Group with 4+ Years of College

TABLE1

Figure Count 73

3/04/88

TABLE OF CONTENTS

Chapter II -- The Economy and the Jobs in Arizona

WORKEMP 2.01 Average Annual Nonagric Wage & Salary Employment in AZ by Major Industry--1980 & 1986
  WORKEMPA .01 Average Wage and Salary Employment--Ranked by Place of Work, 1986
  WORKEMP2 .02 Five-Year Employment Change--1981 to 1986
  WORKEMPC .03 Average Wage & Salary Employment--Ranked by Employment Size, 1981 & 1986

TOURISM 2.01 A Employment in Arizona by Major Industry including Agriculture and Tourism--1984
  TOURISMA .01 Employment by Major Industry--Ranked by Employment Size

CTYEMP 2.02 Employment Trends by Major Industry in Arizona and Selected Counties, 1981 and 1986
  CTYEMP1 .01 Arizona Employment by County
  CTYEMP2 .02 Arizona Employment Changes by County--July 1981 to July 1986
  CTYEMPC .03 Number of Employees in Maricopa County--Ranked by Major Industry, July 1986
  CTYEMPD .04 Number of Employees in Pima County--Ranked by Major Industry, July 1986
  CTYEMPE .05 Number of Employees in Other Counties--Ranked by Major Industry, July 1986

MAJOR 2.03 Major Employers in Arizona by Employment Size, Location, and Type, 1986-87
  MAJORA .01 Major Employers in Arizona -- Ranked by Number of Employees, 1986/87

OCCUP 2.04 Employment Growth in AZ and Employment in Maricopa Co--By Occupational Type, 1987 & 1992
  OCCUP1 .01 Occupational Employment in Arizona--1987
  OCCUP2 .02 Percent Growth in AZ Employment by Type--1987 to 1992
  OCCUP3 .03 Employment by Type in Maricopa Co--As a % of State, 1987

MANAGE 2.05 Selected Managerial and Professional Occupations and Job Openings in Arizona, 1987 & 1992
  MANAGEA .01 Mgr/Prof Occupations % Job Openings--Ranked by Ave Annual Job Openings, 1987-1992

EMPLOY 2.06 Establishments, Employees, and Annual Payroll by Employment-Size Class--Arizona, 1985
  EMPLOY1 .01 Percent of Establishments by Employment Size
  EMPLOY2 .02 Percent of Employees by Employment Size
  EMPLOY3 .03 Percent of Annual Payroll by Employment Size
  EMPLOY4 .04 Average Wages per Employee by Employment Size

ECONOMY 2.07 Characteristics of Arizona Economy as a % of US Economy--1973 to 2000
  ECONOMY1 .01 Arizona Population as a Percent of US Population
  ECONOMY2 .02 Arizona Employment as a Percent of US Employment
  ECONOMY3 .03 Growth in US and Arizona Personal Income--Indexed to 1973
  ECONOMY4 .04 Per Capita Income in US and Arizona--1972 Dollars

MILAZ	2.08	Active Duty Military and Direct Hire Civilian Personnel by Installation/City--AZ, 1985
UNEMP	2.09	Seasonally Adjusted Unemployment Rate in Arizona--January 1986 to April 1987
UNEMP1		.01 Seasonally Adjusted Unemployment Rate
USEMP	2.10	Arizona Employment by Major Industry Compared to the US (1000s of jobs)--1983
USEMPA		.01 Employment by Major Industry--Ranked by % of US Employment
USEMP2		.02 Percent Employment by Major Industry--1983
USEMP3		.03 Percent Employment by Major Industry--2000
USEMP4		.04 Percent Growth in Employment by Major Industry--1983 to 2000
POPEMP	2.11	Total Employment as a % of Population in US, AZ, Maricopa, and Pima Co--1983 and 2000
POPEMP1		.01 Employment as a Percent of Population

Figure Count 28

TABLE2
3/04/88

TABLE OF CONTENTS

Chapter III -- Arizona K-12 Public Education

ENROLL	3.01	Public School Enrollment by Grade in Arizona Counties -- 1986/87
ENROLL1		.01 Enrollment by Grade -- Maricopa, Pima, and Remaining Counties
ENRARIZ	3.02	Public School Enrollment by Grade and Ethnicity in Arizona -- 1986/87
ENRARIZ1		.01 Enrollment by Grade and Ethnicity
ENRARIZ2		.02 Minority Enrollment by Grade
ENRARIZ3		.03 Percent Minority Enrollment by Grade
ENRMARI	3.02 A	Public School Enrollment by Grade and Ethnicity in Maricopa County -- 1986/87
ENRMARI1		.01 Enrollment by Grade and Ethnicity
ENRMARI2		.02 Minority Enrollment by Grade
ENRMARI3		.03 Percent Minority Enrollment by Grade
ENRPIMA	3.02 B	Public School Enrollment by Grade and Ethnicity in Pima County -- 1986/87
ENRPIMA1		.01 Enrollment by Grade and Ethnicity
ENRPIMA2		.02 Minority Enrollment by Grade
ENRPIMA3		.03 Percent Minority Enrollment by Grade
ENROTHR	3.02 C	Public School Enrollment by Grade and Ethnicity in AZ, excl. Maricopa & Pima -- 1986/87
ENROTHR1		.01 Enrollment by Grade and Ethnicity
ENROTHR2		.02 Minority Enrollment by Grade
ENROTHR3		.03 Percent Minority Enrollment by Grade
MARDIST	3.03	Average Daily Membership in Maricopa County School Districts -- 1985/86
MARDISTA		.01 Average Daily Membership -- Ranked by Membership Size
MARDIST2		.02 Average Daiy Membership -- By District Size
PUHSD	3.04	High School Enrollment in Maricopa Co and Phx Union HS District by Ethnicity -- 1986/87
PUHSD1		.01 High School Enrollment in Maricopa County
PUHSD2		.02 High School Enrollment in Maricopa County -- By Ethnicity
PUHSD3		.03 Minority High School Enrollment in Maricopa County
PUHSD4		.04 Percent Minority High School Enrollment in Maricopa County
PUHSD5		.05 High School Enrollment in PUHSD -- By Ethnicity
PUHSD6		.06 Minority High School Enrollment in PUHSD
PUHSD7		.07 Percent Minority High School Enrollment in PUHSD
PUHSD8		.08 High School Enrollment in Maricopa Co, excluding PUHSD -- By Ethnicity
PUHSD9		.09 Minority High School Enrollment in Maricopa Co, excluding PUHSD
PUHSD10		.10 Percent Minority High School Enrollment in Maricopa Co, excluding PUHSD

COHORT	3.05	Cohort Survival of the 1984 9th-Grade Class in AZ Public HS by County -- 1983/84 thru 1986/87
COHORT1		.01 Cohort Survival by County
COHORT2		.02 Cohort Survival -- State Totals
COHORT3		.03 Cohort Survival by Ethnicity -- State Totals
COHORT4		.04 Percent Minority Enrollment -- State Totals
COHORT5		.05 Cohort Survival by Ethnicity -- Maricopa County
COHORT6		.06 Percent Minority Enrollment -- Maricopa County
COHORT7		.07 Percent Minority Enrollment -- Maricopa County
COHORT8		.08 Cohort Survival by Ethnicity -- Pima County
COHORT9		.09 Percent Minority Enrollment -- Pima County
COHORT10		.10 Percent Minority Enrollment -- Pima County
COHORT11		.11 Cohort Survival by Ethnicity -- Excluding Maricopa & Pima County
COHORT12		.12 Percent Minority Enrollment -- Excluding Maricopa & Pima County
COHORT13		.13 Percent Minority Enrollment -- Excluding Maricopa & Pima County
HSLOSS	3.05 A	Percent Loss from 9th Grade to Graduation in AZ HS by Ethnicity -- 1983/84 thru 1986/87
HSLOSS1		.01 Percent Loss -- State Totals
HSPROJ	3.06	Comparison of High School Graduate Projections by Source -- 1980 to 2000
HSPROJ1		.01 AZ High School Graduation Projections -- Compared to Births and 18-Year-Olds
SATTEST	3.07	Average SAT Scores for College-Bound Seniors in the US and Arizona -- 1972 thru 1986
SATTEST1		.01 Average SAT Scores in the US
SATTEST2		.02 Average SAT Scores in Arizona -- Compared to US
ACTAZ	3.08	Mean ACT Scores, Distribution, and Percentile Ranks for AZ Seniors -- 1987
ACTAZ1		.01 Mean ACT Scores in the US and Arizona
ACTAZ2		.02 Frequency Distribution of Mean ACT Scores for AZ Seniors -- Composite Scores
ACTPREF	3.09	Top Twenty Institutions Selected by Students at Time of ACT Testing -- 1987
ACTPREF1		.01 College Preferences of AZ HS Graduates
ACTPREF2		.02 College Preferences of AZ HS Graduates -- ACT Scores > 20
ACTPREF3		.03 College Preferences of AZ HS Graduates -- ACT Scores > 25
ACTMAJ	3.10	Distribution of Intended Majors and Composite ACT Scores for AZ Seniors -- 1987
ACTMAJA		.01 Distribution of Majors and Scores -- Ranked by Percentile Rank
ACTMAJB		.02 Distribution of Majors and Scores -- Ranked by Number of Students
GEDSTAT	3.11	GED Statistics for the U.S., Arizona, and Selected Western States -- 1985 and 1986
GEDSTAT1		.01 GED Recipients as a Percent of HS Graduates -- Aged 19 or Less

Figure Count 50

TABLE3
3/28/88

TABLE OF CONTENTS

Chapter IV -- Arizona Higher Education
Part A

USENR	4.01	AZ Higher Ed Enrollments Compared to the US & Selected States -- Fall 1983
USENR1		.01 % Public Enrollment
USENR2		.02 % Fulltime Enrollment
USFTE	4.02	AZ Public FTE Enrollment by Institutional Type Compared to US & Selected States -- Fall 1983
USFTE1		.01 % FTE Enrollment in Research Universities
USFTE2		.02 % FTE Enrollment in Other Universities
USFTE3		.03 % FTE Enrollment in Comprehensive Colleges
USFTE4		.04 % FTE Enrollment in Two-Year Colleges
AZENR	4.03	AZ Enrollment in Postsecondary Education by Institutional Type -- Fall 1986
AZENR1		.01 Headcount Enrollment by Type
AZENRB		.02 Headcount Enrollment, Ranked by Enrollment Size
HCFTE	4.04	HC and FTE Enrollment for AZ Public Univ and Comm College Districts -- Fall 1981 and Fall 1986
HCFTE1		.01 % Headcount Enrollment -- Fall 1986
HCFTE2		.02 Headcount Enrollment -- Fall 1986
HCFTE3		.03 % Change in Headcount Enrollment -- Fall 1981 to Fall 1986
HCFTE4		.04 % FTE Enrollment -- Fall 1986
HCFTE5		.05 FTE Enrollment -- Fall 1986
HCFTE6		.06 % Change in FTE Enrollment -- Fall 1981 to Fall 1986
HCFTE7		.07 FTE/HC Ratio
HCHIST	4.04 A	History of Headcount Enrollment in AZ Publ Univ & Comm Colleges -- Fall 1976 thru Fall 1986
HCHIST1		.01 Headcount Enrollment in Az Institutions
HCHIST2		.02 Headcount Enrollment in Az Universities
HCHIST3		.03 Headcount Enrollment in Az Community Colleges
HCHIST4		.04 Headcount Enrollment per Arizona Population in AZ Institutions
HCHIST5		.05 Headcount Enrollment per Arizona Population in AZ Universities
HCHIST6		.06 Headcount Enrollment per Arizona Population in AZ Community Colleges
FTEHIST	4.04 B	History of FTE Enrollment in AZ Publ Univ & Comm Colleges -- Fall 1976 thru Fall 1986
FTEHIST1		.01 FTE Enrollment in Az Institutions
FTEHIST2		.02 FTE Enrollment in Az Universities
FTEHIST3		.03 FTE Enrollment in Az Community Colleges
FTEHIST4		.04 FTE Enrollment per Arizona Population in AZ Institutions
FTEHIST5		.05 FTE Enrollment per Arizona Population in AZ Universities
FTEHIST6		.06 FTE Enrollment per Arizona Population in AZ Community Colleges

MINENR	4.05	Headcount Enrollment in AZ Publ Higher Ed by Ethnicity Compared to 1980 HS Grds -- Fall 1986
MINENR1		.01 % Minority Enrollments
MINENR2		.02 % Hispanic Enrollments
MINENR3		.03 % American Indian Enrollments
MINENR4		.04 % Black Enrollments
MINENR5		.05 % Asian Enrollments
STDMIGR	4.06	Student Migration Patterns Into and Out of AZ by State -- 1st Time Students, Fall 1984
STDMIGR1		.01 Net Student Flow to Arizona for Major State Sources
RESIDE	4.06 A	Residency of New Students Enrolled in Arizona Public Institutions -- Fall 1984
RESIDE1		.01 Residency of New Students by Institutional Type
RESIDE2		.02 Residency of New Freshmen by Institutional Type
RESIDE3		.03 Residency of New Students in AZ Universities
RESIDE4		.04 Residency of New Freshmen in AZ Universities
RESIDE5		.05 Major State Sources of New Students
RESIDE6		.06 Major State Sources of New Freshmen
AZSTDS	4.07	Leading Institutions Enrolling AZ Residents as First-Time Freshmen -- Fall 1984
AZSTDSA		.01 Institutions Enrolling AZ Residents, Ranked by Number of Freshmen
HSTRANS	4.07 A	Number of New Undergrad Freshmen from AZ High Schools at ASU, NAU, and UA -- Fall 1987
HSTRANS1		.01 % Distribution of New Freshmen
HSTRANS2		.02 New Resident Freshmen by County of High School
HSTRANSC		.03 Number of Freshmen from Leading AZ High Schools at ASU
HSTRANSD		.04 Number of Freshmen from Leading AZ High Schools at NAU
HSTRANSE		.05 Number of Freshmen from Leading AZ High Schools at UA
CCTRANS	4.07 B	Number of New Transfer Students from AZ Postsecondary Inst at ASU, NAU, and UA -- Fall 1987
CCTRANS1		.01 % Distribution of New Transfers
CCTRANSB		.02 Number of New AZ Transfer Students
ASUAGE	4.08	Age Distribution of ASU Students by Level and Enrollment Status -- Fall 1987
ASUAGE1		.01 Age Distribution by Level
ASUAGE2		.02 Age Distribution by Level in 5-Year Age Groups
ASUAGE3		.03 Age Distribution of Undergraduates, Full-Time and Part-Time
ASUAGE4		.04 Age Distribution of Graduates, Full-Time and Part-Time
UAAGE	4.08 A	Age Distribution of UA Students by Level -- Fall 1987
UAAGE1		.01 Age Distribution by Level
UAAGE2		.02 Age Distribution by Level in 5-Year Age Groups
NAUAGE	4.08 B	Age Distribution of NAU Students by Level -- Fall 1987
NAUAGE1		.01 Age Distribution by Level -- On-Campus Enrollments
NAUAGE2		.02 Age Distribution by Level -- Off-Campus Enrollments
NAUAGE3		.03 Age Distribution by Level in 5-Year Age Groups -- On-Campus Enrollments
NAUAGE4		.04 Age Distribution by Level in 5-Year Age Groups -- Off-Campus Enrollments

CCAGE	4.08 C	Age Distribution in AZ State Community College Districts by County -- Fall 1986
CCAGE1		.01 Age Distribution by County
UNIVENR	4.09	Student Credit Hour and FTE Enrollment in AZ Public Universities -- AY 1985/86
UNIVENR1		.01 FTE Enrollments by Course Level, All Universities
UNIVENR2		.02 FTE Enrollments by Course Level and by University
UNIVSCH	4.10	Total SCH Enrollments in AZ Public Univ by Discipline and Course Level -- AY 1985/86
UNIVSCHA		.01 Total SCH Enrollment, Ranked by Enrollment Size
SCHDISC	4.10 A	SCH Enrollments in AZ Public Universities by Discipline and Course Level -- AY 1985/86
SCHDISC1		.01 Largest Lower Level SCH Enrollment by Discipline
SCHDISC2		.02 Largest Upper Level SCH Enrollment by Discipline
SCHDISC3		.03 Largest Graduate I SCH Enrollment by Discipline
SCHDISC4		.04 Largest Graduate II SCH Enrollment by Discipline
SCHDISC5		.05 SCH Enrollment by Level for Largest Disciplines at ASU
SCHDISC6		.06 SCH Enrollment by Level for Largest Disciplines at UA
SCHDISC7		.07 SCH Enrollment by Level for Largest Disciplines at NAU

Figure Count 68

TABLE4A
3/22/88

TABLE OF CONTENTS

Chapter IV -- Arizona Higher Education
Part B

DEGREES	4.11	Total Degrees Awarded in AZ by Institutional Type -- FY 1985/86
DEGREES1		.01 Degrees Awarded at All AZ Institutions
DEGREES2		.02 Degrees Awarded by Institutional Type
DEGREES3		.03 University Shares of AZ Degrees
MINDEG	4.11 A	Bachelor's Degrees Awarded at AZ Publ Univ Compared to HC Enrollment by Ethnicity -- 1985/86
MINDEG1		.01 Bachelor's Degrees per 1000 Enrollment -- All Universities
MINDEG2		.02 Bachelor's Degrees per 1000 Enrollment -- ASU
MINDEG3		.03 Bachelor's Degrees per 1000 Enrollment -- NAU
MINDEG4		.04 Bachelor's Degrees per 1000 Enrollment -- UA
MINREP	4.11 B	Minority Representation in AZ Pop and Higher Ed -- Fall 1986 and 18-24 Age Cohort in 1980
MINREP1		.01 Minority Percentages
AZDEG	4.12	Degrees Awarded by Field at AZ Public Institutions -- FY 1985/86
AZDEGA		.01 Associate Degrees Awarded
AZDEGB		.02 Bachelor's Degrees Awarded
AZDEGC		.03 Master's Degrees Awarded
AZDEGD		.04 Doctoral and 1st Profesisonal Degrees Awarded
AZDEGE		.05 Total Degrees Awarded
HLTHDEG	4.12 A	Degrees Awarded at AZ Public Institutions in Health-Related Fields -- FY 1985/86
HLTHDEGA		.01 Associate Degrees Awarded
HLTHDEGB		.02 Total Degrees Awarded
UNIVDEG	4.13	Degrees Awarded by Field at ASU, UA, and NAU -- FY 1985/86
UNIVDEG1		.01 Largest Bachelor's Degree Fields at ASU
UNIVDEG2		.02 Largest Master's Degree Fields at ASU
UNIVDEG3		.03 Largest Doctor's Degree Fields at ASU
UNIVDEG4		.04 Largest Bachelor's Degree Fields at UA
UNIVDEG5		.05 Largest Master's Degree Fields at UA
UNIVDEG6		.06 Largest Doctor's Degree Fields at UA
UNIVDEG7		.07 Largest Bachelor's Degree Fields at NAU
UNIVDEG8		.08 Largest Master's Degree Fields at NAU
UNIVDEG9		.09 Largest Doctor's Degree Fields at NAU
USEXP	4.14	R&D Expenditures at US and AZ Univ and Colleges -- Science/Engineering Fields, FY 1985
USEXP1		.01 R&D Expenditures per Capita
USEXP2		.02 R&D Expenditures per Capita by Field
USEXP3		.03 R&D Expenditures by Field

UNIVEXP	4.15	R&D Expenditures by Field at ASU, NAU, and UA -- Science/Engineering Fields, FY 1985
UNIVEXP1		.01 R&D Expenditures by Field
UNIVEXP2		.02 R&D Expenditures as % of US Expenditures at ASU
UNIVEXP3		.03 R&D Expenditures as % of US Expenditures at UA
UNIVEXPD		.04 R&D Expenditures as % of US Expenditures at all Universities
DEFENSE	4.16	National Defense and Non-Defense Outlays for R&D -- 1949 to 1987
DEFENSE1		.01 Defense and Non-Defense Outlays in Current Dollars (Bar Graph)
DEFENSE2		.02 Defense and Non-Defense Outlays in Current Dollars (Line Graph)
DEFENSE3		.03 Defense and Non-Defense Outlays as % of Total (Bar Graph)
DEFENSE4		.04 Defense and Non-Defense Outlays as % of Total (Line Graph)
DEFENSE5		.05 Defense and Non-Defense Outlays as % of GNP (Bar Graph)
DEFENSE6		.06 Defense and Non-Defense Outlays as % of GNP (Line Graph)
DEFENSE7		.07 Defense and Non-Defense Outlays in 1982 Constant Dollars (Bar Graph)
DEFENSE8		.08 Defense and Non-Defense Outlays in 1982 Constant Dollars (Line Graph)
FINANCE	4.17	Factors & State Rankings in State Support of Publ Higher Ed -- US, AZ, & Select States, 1986/87
FINANCE1		.01 High School Graduates per 1000 Population -- Spring 1986
FINANCE2		.02 Annual FTE Students per 1000 Population
FINANCE3		.03 State Tax Capacity ($ per Capita) -- 1985 Estimates
FINANCE4		.04 State Tax Effort (% of Tax Capacity) -- 1985 Estimates
FINANCE5		.05 State Tax Revenues ($ per Capita) -- 1985 Estimates
FINANCE6		.06 Public Appropriations per FTE Student
FINANCE7		.07 Tuition Factor (% of Appropriations + Tuition)
FINANCE8		.08 Net Tuition per FTE Student
FINANCE9		.09 Appropriations + Tuition per FTE Student
FINREV	4.18	Current Funds Revenues by Source for AZ Public Univ and Selected Institutions -- FY 1985/86
FINREVA		.01 Comparison of FTE Enrollments -- More than 14,000 FTE
FINREVA1		.01A Comparison of FTE Enrollments -- Less than 14,000 FTE
FINREVB		.02 Comparison of State and Local Appropriations -- More than 14,000 FTE
FINREVB1		.02A Comparison of State and Local Appropriations -- Less than 14,000 FTE
FINREVC		.03 Comparison of Tuition Revenues -- More than 14,000 FTE
FINREVC1		.03A Comparison of Tuition Revenues -- Less than 14,000 FTE
FINREVD		.04 Comparison of Grants and Contracts Revenues -- More than 14,000 FTE
FINREVD1		.04A Comparison of Grants and Contracts Revenues -- Less than 14,000 FTE
FINREVE		.05 Comparison of Federal Appropriations -- More than 14,000 FTE
FINREVE1		.05A Comparison of Federal Appropriations -- Less than 14,000 FTE
FINREVF		.06 Comparison of Endowment Income -- More than 14,000 FTE
FINREVF1		.06A Comparison of Endowment Income -- Less than 14,000 FTE
FINEXP	4.18 A	Current Funds Expenditures for AZ Public Universities and Selected Institutions -- FY 1985/86
FINEXPA		.01 Comparison of Instruction Expenditures -- More than 14,000 FTE
FINEXPA1		.01A Comparison of Instruction Expenditures -- Less than 14,000 FTE
FINEXPB		.02 Comparison of Research Expenditures -- More than 14,000 FTE
FINEXPB1		.02A Comparison of Research Expenditures -- Less than 14,000 FTE
FINEXPC		.03 Comparison of Public Service Expenditures -- More than 14,000 FTE
FINEXPC1		.03A Comparison of Public Service Expenditures -- Less than 14,000 FTE
FINEXPD		.04 Comparison of Total E&G Costs -- More than 14,000 FTE
FINEXPD1		.04A Comparison of Total E&G Costs -- Less than 14,000 FTE
FINEXPE		.05 Comparison of Scholarship and Fellowship Expenditures -- More than 14,000 FTE
FINEXPE1		.05A Comparison of Scholarship and Fellowship Expenditures -- Less than 14,000 FTE
FINEXPF		.06 Comparison of Library Expenditures -- More than 14,000 FTE
FINEXPF1		.06A Comparison of Library Expenditures -- Less than 14,000 FTE

APPROP	4.19	Trends in State General Fund Appropriations -- FY 19877/78 to 1987/88
APPROP1		.01 General Fund Appropriations by Type
APPROP2		.02 Higher Education General Fund Appropriations
APPROP3		.03 Higher Education General Fund Appropriations as % of General Fund
UNIVAPP	4.19 A	State Appropriations to Arizona Public Universities -- FY 1987/88
UNIVAPP1		.01 Appropriations as a Percent of Total University Appropriations
FUNDS	4.20	Sources of Operating Funds for AZ Public Higher Education Institutions -- FY 1986
FUNDS1		.01 Revenue Sources for AZ Universities
FUNDS2		.02 Revenue Sources for AZ Community Colleges
FUNDS3		.03 Revenue Sources for AZ Higher Education
STDAID	4.21	State and Local Appropriations for Student Aid in AZ and Selected States -- FY 1984
STDAID1		.01 Student Aid Appropriations per FTE Student
IMPACTS	4.22	Summary of the Economic Impacts of Arizona's Public Universities
IMPACTSA		.01 Public Higher Ed as a Major Industry in AZ

Figure Count 81

TABLE4B
3/22/88

SOME THOUGHTS ABOUT APPROACHING THE FUTURE OF ARIZONA

ROGER L. CALDWELL

INTRODUCTION

It is highly appropriate for Arizona to discuss the long term future of the state as we approach the 21st Century. Several Arizona cities have mounted efforts to assess their directions over the next decade or so. The Board of Regents has established a Task Force on Excellence, Efficiency, and Competitiveness, which as part of its activities is attempting to anticipate possible changes in Arizona as they will affect the higher education needs of the state.

It is important to consider these long term outlooks to better understand how they might affect today's planning activities. I believe the question is especially timely, for there are several aspects of Arizona that are in the process of change, and these changes will affect all of us. I will approach the "thoughts about the future" by giving a few assumptions, looking backward for an equal time frame, looking for the "major" forces that might shape the future, and then identify some critical issues and their implications for Arizona over the next several decades.

ASSUMPTIONS

One of the major problems in dealing with the future involves clarifying assumptions. People tend to look at the world through their experiences and personal value systems, and this causes all of us to approach an issue from very different perspectives. What are facts to some people are desires or false information to other people. Let me therefore begin with a statement of three assumptions:

1) it is not possible to predict the future over long periods, and therefore we should not try to be too specific in our discussions (neither should we be too general);

2) it is possible to observe and understand forces of change that suggest certain events have a greater probability than others (or a low probability but a potentially high impact); and

3) we can influence these trends today and therefore are in a position to shape the future. This latter point is especially true in Arizona, where the growth rates are relatively rapid (and therefore the results of changes can be seen more clearly), and where the size of or complexity of the issues are manageable. Before we discuss some ideas about the next 25 years, what has happened over the last 25?

Roger L. Caldwell has been a member of the University of Arizona for 20 years, where he is a Professor of Soil and Water Science. He has served in several administrative positions relating to general environment, energy conservation, computing and information services, and academic planning. He has taught in the fields of plant diseases and pesticides, environment, alternative futures, and scientific communication methods. He has served on several state and local governmental committees relating to economic development, transportation and environmental concerns.

WHAT HAS CHANGED IN THE LAST 25 YEARS?

A number of years ago, say during the 1950s and 1960s, it was relatively easy to understand the important future issues relating to the state as a whole. In this previous 25 or so year period, the state grew rapidly, and felt few constraints on that growth. The economy slowly shifted from agriculture and mining to manufacturing and tourism. Other fundamental changes were beginning to occur, for example, the availability and widespread use of the common air conditioner (refrigeration) that greatly assisted development in the state.
Several leaders were assassinated (John Kennedy, Martin Luther King, Anwar Sadat), and an oil embargo caused increases in energy prices in 1973 and again in 1978. We also saw the first human on the moon, the introduction of the inexpensive and powerful microcomputer, and the beginnings of designing by biotechnology new organisms that produced products for human use.

Further, in the last decade or so, other changes have surfaced: an increase in two income families, single parent families, equal opportunity employment, increased national and international debt and negative trade balances, and decreased savings rates by individuals.

New technologies, working conditions, job opportunities, and health issues now face us. It is sometimes difficult to see changes as we participate in them. It is somewhat like watching how a child grows from the perspective of an occasional visit to that of daily observance. It is important to recognize that significant change, often unexpected, has taken place in the past.

MAJOR FORCES OF CHANGE

We must first try to find the several major forces that could shape the future, and to categorize them. While different people might do this in various ways, let me select six major categories: population, economy, technology, politics, society, and environment/health.

Further, there are the unanticipated "acts of God" that could occur, including nuclear war, Three Mile Island nuclear generation replicas, AIDS, earthquakes, and climatic change to affect water supplies in arid areas. Within each of these some shifts are occurring. Consider population for example. The initial "baby boomers" recently turned 40, so the age distribution (nationally and in Arizona) will have a "bulge" in middle age rather than in the early job attainment years (and years of greatest migration rate). This phenomenon will have profound effects on Arizona, in job opportunities, population migration patterns, health care, and marketing needs. Within the economic area, the alternative solutions to national (and international) debt will cause changes in the role of the government, the types of jobs that are available, and may cause different purchasing patterns for all sectors of society. The increased integration of the United States into the world economy makes us less immune to international business cycles and decisions of other countries.

There are many technological changes taking place, and there will be more that are difficult to assess at this stage. Some of the more important are the information industry (computing, data access, working via electronic links), the materials industry (ceramic and strong but light synthetic structures), and the biological discoveries (genetic engineering, drug design, replacement of body components). As these new activities emerge, and old ones decline, we will need people trained (or retrained) in subject areas that may exist today.

These new technologies will also raise new questions, such as the role of privacy in an information society, the ethics of organ transplants or health care for the very old, and availability of services (or access to information) based on economic class. In addition, as technological change increases the "complexity" of daily life, we will need a broadly educated public to participate in society (e.g., discussing the ethics of prolonging life).

Political and social views have tended to cycle over long time periods (on the order of generations). With the increased availability of information, including rapid publication of specialized magazines-books, and the relative ease of access by a broad spectrum of individuals, the political "views" will not fall into simple categories (the historic two major parties). It is more difficult to determine how these alliances will be built, how long the process will take, and how the alliances will shift and interact on the various issues. Public and private attitudes also shift, and in the next few years we could see a replay of some of the views of 20-30 years ago (less "me generation" and more social activism).

Along with societal changes, we will likely see "power shifts" in the composition of community leader groups. The change will be toward a greater need for negotiation or consensus building, will involve evaluating a series of alternatives, and will involve a number of people, rather than approaches that might appear to be simple decisions by a relatively small number of people.

Environmental concerns (e.g., quality of life and health factors) will gain in importance for Arizona, as the increase in population causes a loss of amenities (clear air, short drives) and as the population age distribution shifts (more young and old). This shift has as yet unrealized consequences on retirement programs and health care industries in the next 25 year period.

All changes, whether these examples or others, will likely occur at different rates within different societal groups. The changes will appear small (like the child growing up when viewed on a daily basis), but over time, small changes cause large differences. For example, when the oil embargo occurred in 1973, changes were made that nearly doubled the fuel efficiency standards. Since the "typical" car lasts 15 years, the majority of cars on the road today are approaching these new standards.

Change is difficult to pinpoint. For example, in the last 10 years, estimates (from one source) of the Arizona population in the year 2000 have ranged from 3.9 to 5.3 million. It currently ranges from 4.4 to 5.3 million according to two sources. For that reason, I will focus on the critical issues and their implications, rather than attempt to identify specific events.

CRITICAL ISSUES

How do these major forces of change develop into the critical issues facing the state? What are the critical issues facing Arizona in the next 25 years? We could make a listing of specific items (like water availability, types of jobs, or amount of solar energy used), but getting that specific over such a long time period is inappropriate for two reasons:

1) we will likely miss the target because there are too many uncertainties about specific items, or

2) we will concentrate on too much detail and miss the overall forces and trends, which will really be the important influences on the future.

A listing of these critical issues will differ according to who develops the material and how deeply one delves into detail. I will attempt to combine the major forces of change into two critical issues for discussion.

First, the infrastructure (physical and human services, analytical capability) of the state might become more mature as the growth rate of the state slows and the demands for services (which lag behind growth but may eventually) continue to increase.

Second, the political and social climate will shift to include a range of subjects and an increase in the types and diversity of individuals involved in the issues.

The effects of these two changes will cause conflicts in the ways we are accustomed to operating, and will generate discussion in areas that are somewhat unfamiliar; therefore the change will not come easily.

IMPLICATIONS

What are the implications of these possible future changes? Here are some "guidelines" we might identify by reviewing these major forces of change:

1) There will be some uncertainty over the next decade or so as Arizona "matures" from a rapid growth state to one resembling many other states. This will be further influenced by national and international economic events (e.g., debt) and political events (e.g., Middle East or Central America/Mexico).

2) Shifts will not be immediately obvious, because some will occur slowly and many will occur at different rates in various parts of society.

3) The uncertainty, coupled with current information technologies which allow technical ease of access to information sources, will enable multiple viewpoints to be heard. This will cause, at times, conflicting information about the different perceived "best" directions to take.

CONCLUSIONS

We should be able to define the major forces of change and the critical issues that may emerge from these forces or their interactions. What are the critical issues of the next 25 years? By focusing on the forces of change rather than the results of these forces, we are forced in part, to identify the actual changes ourselves. The critical issues are few and have substantial consequences. I have identified several categories of issues in the form of the population changes, economic conditions, technological change, and political, social, and quality of life shifts.

Could we have foreseen these events, if we had been looking for them? While there are some events that really are surprises, most give early warnings if you had a little radar system scanning the horizon for signals (including the oil embargo and its after effects).
Understanding the future is not trying to

predict it. Rather, it is more in looking for these "early warning signals" and understanding how to interpret them, in finding the few major events that are likely to produce the most significant effects (positive or negative), in reassessing old assumptions, and in remaining flexible as you continually reevaluate conditions.

It is important to look at both the positive and negative aspects of new happenings, as well as further impacts of the initial impacts (e.g., the invention of the car brought highways, then urban traffic, then air pollution, then catalytic converters, and so on). The US Congress has approached this by creating an Office of Technology Assessment (1972) to study impacts of today's technologies (an approach to the new field of technology assessment). It seems to me there are several such signals evident today; what is difficult is interpreting their impacts and evaluating the timing. There are many techniques for developing this foresight, and since it is an uncertain enterprise, one must use multiple approaches and consult a variety of sources and points of view.

What will the future look like? Society is large and complex, so much of what we see today may still be evident in the next 25 years, just as much of what we remember of 25 years ago is still apparent. Looking back 25 years may give some indication of the size of the changes we could expect, but they are likely to be greater, as the rate of change is increasing. It is relatively clear (to me at least) that one of the best approaches to the next 25 years is to retain flexibility and keep alert for new directions; it is surprising how many things seem clear in retrospect, and we can learn to anticipate change (in both the future and the present) to minimize its negative effects as well as capitalize on the positive aspects.

A few critical events (either anticipated or as surprises) could have profound effects. What is the likelihood of the economy of Mexico collapsing, causing a significant increase in migration rates to Arizona? What is the likelihood of sufficient instability in the Middle East to cause a large scale energy supply disruption? How will changes in the economies of other states affect population migration rates to or from Arizona?

FORESIGHT: DEFINITION AND NEED FOR ARIZONA UNIVERSITIES

ROGER L. CALDWELL

INTRODUCTION

Institutions of all types, including universities, recognize to varying degrees a need to base their decisions on adequate consideration of key external and internal trends, as well as potential changes in those trends. These institutions, if they are to continue to provide quality products, must evaluate their own strengths and weaknesses in terms of present and anticipated operating environments. This future-oriented understanding of today's events and developing patterns requires genuine commitment; an institution cannot afford to be merely reactive or shortsighted when dealing with potentially significant and long term impacts of everyday decisions.

Several terms have been used to describe the process of classifying change and its impact on an organization. The most widely used are "environmental scanning" and "issues management," but each of these carries specific connotations which are insufficient to portray the process intended here. For example, environmental scanning implies a review of trends and current data (historic events) with projections into the foreseeable future; issues management suggests the identification of emerging trends or issues. "Foresight" is becoming more conspicuous as a means of describing the relevant process. This term connotes a more broad-based, future-oriented evaluation, intended to serve as an early warning system, rather than a detailed collection of specific data. It includes an interdisciplinary approach and involves consideration of possible multiple causes and effects.

Foresight activities are now practiced by business and industry, government, nonprofit organizations and educational institutions[1]. These activities form a fundamental basis for strategic planning as well as more focused immediate decision making. Changes seem to be occurring more rapidly, hence the consequences of both informed and uninformed decisions are greater. The seemingly complex "modern times" may draw increased attention to the goal of recognizing future trends, but the need for foresight has always existed. Many examples demonstrate occasions when a practical type of foresight might have been advantageous.[2]

It should be noted that any institution performs some version of foresight. The process may be formal or informal, usually involves a number of individuals, and most likely has been more or less effective in the past. As we move to a time of greater uncertainties, more rapid

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rates of change, and an increased need for information sharing or participation, many thoughtful people recognize the need for a more formal process of foresightful planning.

This paper will describe briefly the purpose of foresight and its relevance to the Arizona universities and the Arizona Board of Regents, describe ways of performing the process, identify possible pitfalls, characterize key ingredients in a successful program, and list some examples of recent foresight assessments (Appendix A) and significant problems that could have been minimized by such an assessment (Appendix B).

The specific purposes for foresight are:

1. To provide background information for strategic planning activities by early recognition of changes (beneficial or adverse) in trends, cycles, or fads, and identification of emerging trends or major discontinuations of current trends or their interactions.
2. To develop a general framework within which to make today's decisions, based on societal directions and expectations in relation to university programs and activities. (Such a context is essential to understand the potential consequences of any single decision and the relationships of several decisions to each other.)
3. To avoid future negative consequences and costs of ignoring external and internal factors during times of uncertainty.

FORESIGHT TECHNIQUES

Before selecting specific techniques, for purposes of further discussion, we should state several assumptions about both the process and its relevance to Arizona universities. First, the "scanning" aspects of the process are more important than the collection of large amounts of extraneous information. Second, accumulating information across disciplines and evaluating the resulting interactions is more useful than learning a great deal about only a few areas. Third, the process should not be costly and should minimize duplication of other efforts. Finally, the process should be ongoing, since society and "current" issues are constantly in a state of flux.

The foresight toolbox contains a variety of techniques. Some selected tools might include the following:

1. LITERATURE REVIEWS. Selected literature sources can be monitored for both data and ideas; some may be summarized by other people but certain ones will require original reading. One component of reviewing published materials involves state and federal legislative bills and the results of their hearings.
2. SMALL GROUP DISCUSSIONS. Occasional meetings with small groups of people who represent diverse interests will allow follow-up discussion and provide unanticipated contributions.
3. ROUNDTABLES OR ADVISORY COMMITTEES. Continuing interaction with "blue ribbon" groups will provide continuity and increase network contacts of all group members for future sharing of relevant information.
4. ANONYMOUS INTERVIEWS OR SURVEYS. Non-structured interviews on general topics, conducted anonymously and individually with a cross selection of opinion leaders and

the general public will provide insight that may be more difficult to obtain from formal public statements. Surveys may provide either insight or indicate a lack of understanding by respondents in certain areas, which additional foresight tools could serve to clarify.

While the final product will likely take many forms, the educational aspects of the process itself may well be the most significant result. Specific products might include -- analytical position papers on selected issues, lists of emerging trends or uncertainties, or formal meetings (with appropriate discussion and publication of the proceedings).

IMPLEMENTATION ISSUES AND POSSIBLE PITFALLS

To be effective, any foresight process requires the involvement and support of those who will benefit from the results; therefore, the "need" for the process must be recognized and established by those who will be using it. Some foresight information can be collected by almost anyone (e.g., published listings of current trends), but other types of data should be collected by certain groups (e.g., probabilities of emerging trends, analyses of causative factors and possible consequences); the task of sorting out the appropriate responsibilities will not be easy. Care must be taken that the process is not "formalized" to such a point that it becomes meaningless; thus, the stress should be on "facilitating" the interactive thoughts of diverse groups rather than specifying an "office" to perform all functions internally.

Any new processes that are not clearly defined and do not have a generally perceived need will not be effectively implemented. The need for foresight capabilities is not immediately obvious, especially if operating on existing trends or annual incremental changes has been the habitual mode. The foresight capability takes on a new importance, however, when strategic visions are considered, when the operating climate is somewhat uncertain, and when change is likely to occur. On the other hand, the urgency for decisions involving near term actions may override the desire for longer term analysis and examinations of uncertainty; the speed offered by limited consultations with a few people conflicts with the need for repeated discussions with many people; and the relatively simple analysis of a few issues may be more appealing than the complex consideration of a number of issues and their interactions. These factors suggest that existing and comfortable processes will not be altered unless change offers clear advantages.

The challenge will be to perform appropriate but limited foresight activities and avoid the temptation to build large, unwieldy, duplicative databases or libraries of "possible trends" which consume excessive time and effort. Additional challenges are to impose constraining requirements of interdisciplinary or broad discussion on the process and to involve end users early enough so they will believe in the process and be willing to listen to the results.

KEY INGREDIENTS FOR A SUCCESSFUL PROGRAM

Formal foresight activities can take many forms; there is no one model that can apply to all situations or organizations. However, certain factors seem critical to any successful approach:

1. UNDERSTAND TODAY'S REALITIES FIRST. Any attempt to understand the range of possible future conditions must be based on a prior understanding of present realities. Part of this process should be directed at a careful understanding of the strengths and weaknesses of the institution. While this is not an easy task, the exercise and lessons learned will strengthen the foresight process when it is fully developed.

2. INVOLVE THE END USER. Those who will use the information developed in the process must be involved in the early stages. Given the diversity and management structure of a modern university, the number of people could (and should) be quite large. This involvement also increases the likelihood that the product will influence the decision making process.

3. DON'T COMPETE WITH THE DISCIPLINES. The reservoir of disciplinary expertise on the university campus should be linked by relevant questions, with any disparity between disciplinary perspectives noted. The foresight process should be structured to become institutionalized (and therefore integrated with other institutional units), rather than reflecting the focus of a particular individual.

4. EVALUATE BOTH DATA AND IDEAS. Quantitative data are easy to find and thus likely to be evaluated; but ideas, issues, and other qualitative information are also important. This information should be from multiple sources and disciplines, and the process should allow for integration of results and examination of conflicting findings. Both data and ideas should be discussed with non-university representatives for external validation. Care must be taken to include both the positive and negative aspects of an issue; it is not useful to be too pollyana-like or too doomsday-like.

5. DO NOT DEPEND ON A SINGLE SOURCE OF INFORMATION. Trying to understand future options and issues requires some redundancy of information gathering efforts. This might take the form of multiple sources of information or of cooperative collection efforts by several groups.

6. BEGIN SMALL AND THOUGHTFULLY. The complexity of working with a significant number of people and discussing subjects on which they might hold divergent views should not be underestimated. Principles for the initial stages should be to think small, to establish deadlines, to develop selection criteria for identifying issues, and to build credibility. This is an important time to build a volunteer network for future involvement of those in and out of the organization.

CONCLUSIONS

In recent years, Arizona has grown rapidly and the local and national economies have benefited from the growth in university research and instructional program diversity. The next decade, however, will bring more uncertainty in many areas involving both the state and the university[3]. A university cannot practically plan for the next decade or two without a strong sense of conditions external to the institution, and without identifying appropriate internal resource shifts needed to meet those conditions. In the process of making today's decisions and of developing a strategic plan, foresight activities are a necessary ingredient of effective operations.

With the exception of short term economic forecasting, commonly used projection activities that might be considered equivalent to foresight are unstructured, fragmented and not widely shared with those having to make decisions. A foresight capability would provide support for analysis of alternatives, benefit from similar efforts in non-university environments (through appropriate links to representatives in those areas), and increase exposure of decision makers to broader ranges of possible actions and the probable consequences. It has direct and practical links to the planning and budgeting processes.

Arizona universities enjoy an impressive level of internal expertise, as well as significant links through various university faculty and administrators to non-university groups. With some organized efforts to link these information sources, the universities could develop a foresight capability that is more effective at less cost than other institutions. While it is not immediately clear how the workload should be distributed among the various universities and the Regents' staff or where the responsibilities would logically be located within an institution, a certain level of cooperative effort seems appropriate.

RECOMMENDATION

Foresight capability should be developed in the Arizona universities and the Regents' staff in support of both strategic planning and current decision processes. The role of the Regents' staff should be focused on the broad issues which are factual and useful to all the universities (e.g., demographic trends, national educational studies, and regional inquiries). The data and tentative conclusions should be shared fully by those participating in the process.

APPENDIX A:

Recent Examples of Foresight Efforts by US Office of Technology Assessment*

TECHNOLOGY AND STRUCTURAL UNEMPLOYMENT: REDEPLOYING DISPLACED ADULTS (February 1986, 448 pages, OTA-ITE-250).

Assesses the reasons and outlook for adult displacement, evaluates the performance of programs to serve displaced adults, and identifies options for improving service. The report also examines trends in international trade and their effects on worker displacement.

U.S. VULNERABILITY TO OIL IMPORT CURTAILMENT: THE OIL REPLACEMENT CAPABILITY (September 1984, 160 pages, OTA-E-243).

Provides an analysis of the technical potential for replacing large quantities of oil in the United States over a 5-year period by fuel substitution and conservation in the event of an extended oil supply shortfall and price rise; analyzes the macro-economic consequences of the shortfall and various rates of oil replacement by the technologies.

LIFE SUSTAINING TECHNOLOGIES FOR THE ELDERLY (in press, OTA-BA-306).

Reviews and evaluates the appropriate use of life-sustaining technologies, quality of life, patients' rights, surrogate decision making, and allocation of Federal health care resources.

INFORMATION TECHNOLOGY AND ITS IMPACT ON AMERICAN EDUCATION (November 1982, 280 pages, OTA-CIT-187).

Provides an overview of the issues relating to the educational applications of the new information technologies; examines both the demands that the information revolution will make on education and the opportunities afforded by the new information technologies to meet those demands.

TECHNOLOGY, INNOVATION, AND REGIONAL ECONOMIC DEVELOPMENT (July 1984, 168 pages, OTA-STI-238).

Identifies and describes the efforts of State and local governments, universities, and private sector groups to promote the creation, expansion, and retention of high-technology firms and industries.

TECHNOLOGY, PUBLIC POLICY, AND THE CHANGING STRUCTURE OF AMERICAN AGRICULTURE (March 1986, 380 pages, OTA-F-285).

Focuses on future and emerging technologies in other animal, plant, chemical, mechanization, and information areas and their implications for agricultural structure. Also explores linkages between policy and structure for a clearer understanding of the factors that influence the evolution of the agricultural sector.

APPENDIX B:

Historic Examples of Results of Not Using Foresight Capability*

THE CYCLAMATE AFFAIR (October 1969).

Diet sweetener was found to cause cancer in rats in long term feeding studies. The U.S. Food and Drug Administration announced all products containing cyclamates were to be off market by February 1, 1970. Public confusion developed because of conflicting decisions by official agencies and industry (as a result of legislative interpretation, limited data, closely held evaluations, and large scale use before adequate testing was completed). Data existed to enable an assessment 10 years in advance. Comment: the rapid commercialization of a new product exceeded the knowledge of side effects.

THE TORREY CANYON DISASTER (March 1967)

The first episode of a sea-going tanker running aground happened off the coast of Britain, spilling most of the 119,328 tons of cargo through a 650 foot long hole in the 974 foot ship. The sea currents carried the spill along the entire coast of Cornwall, causing damage to beaches and death to seabirds. Eventually the ship owners paid $7.2 million in damages. This tanker was flying the Liberian flag, was on charter from Union Oil of California to British Petroleum to haul oil from the Persian Gulf to Wales, was a well equipped vessel, and had an experienced Italian crew. The ship ran into a well-known navigational obstacle (reef) at top speed in a six mile wide channel. In addition, the weather was clear (8 mile visibility), and the ship was within range of three lighthouses, a lightship, and a radio beacon. The problem was that it got off course and by the time the autopilot had been turned off it was too late to change course. Comment: the rapid increase in supertanker technology was not matched by understanding of the risks. The event led extensive studies in combating oil spills.

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* U.S. Congress, Office of Technology Assessment. Established in 1972 (P.L. 92-484) to consider the complexity, breadth, and long-term implications of technology. Reports selected to provide examples of types of analyses.

THE ASBESTOS HEALTH THREAT (Early 1960s).

Public discussion began related to the long known cancer of the lung in many heavily exposed asbestos workers. The health hazards were known and generally accepted as a risk to working with the materials. In 1971 the then new Environmental Protection Agency began regulatory actions. Differing opinions of experts, the various routes of exposure, and the long term incubation times make the direct links of these types of problems difficult to evaluate. Comment: the health impacts (to workers) were long known but the product was widely used and made a major impact on the economy. After publication of the Technology and Social Shock book, the following events occurred: bankruptcy for the major manufacturer, closure of an asbestos mine in Globe, AZ (where residences were placed on the tailings), and continued (today) concern/costs for removal of asbestos from public schools.

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Endnotes:

1. Several universities, perhaps two dozen, are using varying forms of environmental scanning.
2. Some examples include: animal rights concerns relating to university research animals, oil embargo and energy conservation actions, selected budget trends for specific sectors of society, environmental movement and resulting regulatory climate, and population shifts by age and location.
3. These uncertainties are addressed in a separate working paper, which includes a discussion of major driving forces, selected trends, and possible effects on universities.

ARIZONA'S UNIVERSITIES IN TRANSITION

ROGER L. CALDWELL

PREFACE

This working paper was prepared near the end of the Task Force year. It consolidates a number of ad hoc analyses done over that period and presents them in a single document. In most cases, the data are presented with little commentary. These data can serve as additional components for analyzing the internal and external environment for strategic planning and mission statement development. In addition, the working paper discusses some of the "transition" times experienced by the Arizona universities.

The information presented here in most cases does not duplicate the contents of the "fact books" published annually by each university and the Board of Regents. While specific data are presented in the other working papers, there are four that contain a significant amount of data of the type presented here and therefore are these data are not duplicated in this paper (although portions of summaries are listed when necessary to provide a complete picture). These are:

1. Arizona Environmental Scan Study.
2. The Arizona Universities: A 25 Year State Funding, Productivity, and Performance Outputs History.
3. Arizona Universities Program Changes Nine Year Summary: FY 1981-1989.
4. Enrollment at Arizona Universities: Forecasts to 2000.
5. Future Changes: Implications for Arizona's Universities.

INTRODUCTION

PURPOSE

The purpose of this working paper is twofold:

1. to list selected data, not generally available, that were found useful in identifying and developing Task Force issues; and
2. to provide a brief description of the "transition" of the Arizona universities over the last three decades to become much different institutions. The data in this working paper can be used especially for additional background information relating to the identification of university missions and programmatic focal areas.

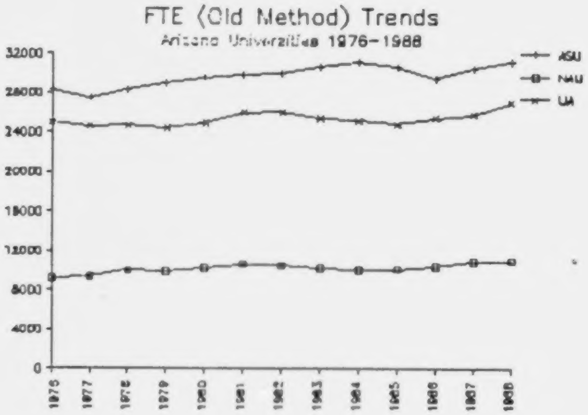
Roger L. Caldwell has been a member of the University of Arizona for 20 years, where he is a Professor of Soil and Water Science. He has served in several administrative positions relating to general environment, energy conservation, computing and information services, and academic planning. He has taught in the fields of plant diseases and pesticides, environment, alternative futures, and scientific communication methods. He has served on several state and local governmental committees relating to economic development, transportation and environmental concerns.

While these data will not allow determination of the "vision" of the university, used in conjunction with other Task Force working papers they provide some assistance in identifying the "current and historic status" of the universities. In addition, these data provide a baseline for future assessments related to which programs are selected for continued focus and which areas can be maintained "as is" while emphases are shifted to new areas.

By looking at types of degrees, the distribution of degree production, the location within the university of research funding, and the comparison of each of these components among the universities in Arizona and the nation, a pattern begins to emerge that provides a snapshot of the overall university. These patterns suggest that the three universities are at different stages of development and have different focal areas; accordingly, they have different needs and products. However, the data presented here are not comprehensive and overall conclusions should not be reached by just this information.

The Arizona universities have undergone a period of relatively rapid enrollment growth, followed by a consolidation period, moved to a present growth period, to be followed by some variation (possible loss followed by rapid gain) in enrollment.[1] Specifically, these universities had relatively rapid growth, as did much of higher education, for the 20 year period from about 1955 to about 1975. For the decade from 1975 to about 1984, enrollment was relatively static, and in the last 3 years enrollment has increased (Figure 1); a complete set of the data for these trends is found in Table A1.

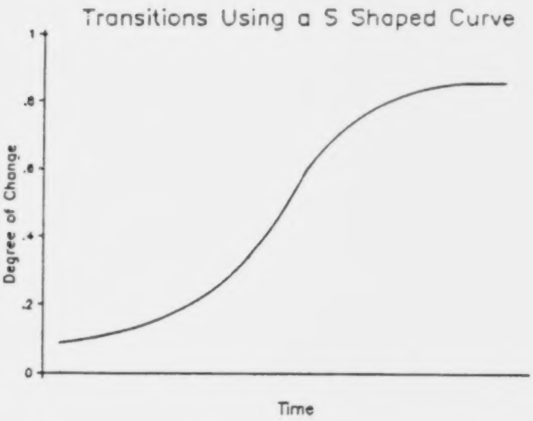
Figure 1.Full Time Equivalent Enrollments at Arizona Universities



CHANGING TIMES

The maturation of an organization can be described by an "S" shaped curve (Figure 2) or by a series of such curves as different levels of maturity or major change occur.[2] As change perturbs equilibrium in the organization, growth (or decline) occurs and a new equilibrium state is reached. Generally, these changes occur continually to varying degrees and the overall analysis is complex. Different parts of an institution are at different stages of change, and will be at different places along a series of "S" curves. In addition, certain changes are more easily recognized, causing less visible, but perhaps more important, changes to be obscured. As we monitor progress of the universities, it is important to know which variables are the relevant choices when there are so many from which to choose.

Figure 2. The S Shaped Curve.



Examples of easily identifiable changes in universities include student headcount and FTE enrollments, degrees produced by discipline, state budget, and externally funded projects for research and other sponsored projects. The less observed changes that occur include administrative restructuring, administrative and academic computing support needs that often change with technological innovation and university growth, ease of communication among participants in the institution, institutional focus shifts, and general hard-to-see support level activities for the more visible, major activities.

Some universities in the United States, while having nearly the same age as some of the Arizona universities, have been in the "major university" class for a number of years. Examples include University of California at Berkeley, University of Wisconsin, University of Illinois, MIT, Harvard University, University of Michigan, and University of Washington. Others have undergone major transitions in the last several decades; these include Stanford University, University of California at Davis, University of California at Los Angeles, and University of California at San Diego. Such transitions require major efforts in human and financial resources, time, and vision. The Arizona universities have begun these major transitions more recently (perhaps in the last 20 years).

The change of a university over time also relates to alternatives in the surrounding area and in the type of company it keeps; the local conditions include nearby educational institutions for student competition, the role of the university as a state resource, and the availability of specialty institutions that can offer degrees in areas of professional interest (e.g., education, business, engineering). In some cases the non-existence of geographically close alternatives may require the institution to appear to have duplication of effort with other institutions. Other major considerations in evaluating these changes are the internal conditions of the university, historic university activities and inertia of organizations due to inside practices and external demands. Again, the Arizona universities are at different stages along their individual maturity curves, and their needs and products differ. This is an important consideration that is often obscured with the simple evaluation of numerical trends of selected variables.

SOME CAUTIONS

The data presented here are taken from different sources. In general, the definitions used by the various sources are in close agreement, but caution should be taken in detailed analyses. For example, the definition of a full time student (FTE) is now markedly different in Arizona than in other states. The classification of degrees awarded can depend on which part of the institution the particular student was enrolled and the types of organizations that existed at that location. The amount of sponsored research funding is dependent not only on the quality and number of faculty and specialties of the university, but also on the type of university (e.g., medical school, land grant status) and the type of sponsored projects funding attracted (basic research, technical support, public service, student scholarships). When comparing these factors among institutions, such qualifications need be kept in mind.[3]

INSTITUTIONAL HISTORIES

The Arizona legislature in 1945 created a single governing board (Board of Regents) for the three institutions, whereas only the University of Arizona had been under control of the previous constitutionally created governing board. In 1966, when all three institutions were designated as universities, the legislature changed the name of the governing board to the Arizona Board of Regents.

The major organizational changes in Arizona higher education have occurred during the last 30 or so years. The University of Arizona was established in 1885 with special land grant status, focusing on research and broad range of subjects; the designation of an education college did not occur until 1922. On the other hand, Arizona State University did not become a university until 1958, and consisted only of an education college until 1945. Northern Arizona University became a university in 1966 and had its first non-education college in 1958. The community colleges of Arizona grew rapidly with the formation of a statewide system in 1960.

This varied history of Arizona higher education causes continuing and profound impacts on the Arizona universities as they adapt to the changing needs of the state, which have also undergone major shifts in the last 30 years. Understanding the institutional histories, along with the changes in the external environment, brings about recognition of how the universities are changing relative to one another. It further helps us to better understand the different needs of each university, the progress of each university in changing its areas of emphasis, and the challenges confronting a rapidly growing state and its educational institutions.

ARIZONA STATE UNIVERSITY HISTORY

ASU was established in 1886 as Territorial Normal School of Arizona and the name was changed to Tempe State Teachers College at Tempe in 1925. It was then designated Arizona State Teachers and the first multidiscipline curriculum (other than education) added in 1945. Again renamed Arizona State Teachers College at Tempe in 1945, and in 1954 was permitted to establish four colleges. However, it was not designated Arizona State University until 1958, as a result of a state referendum. A research park was created in 1984, international programs began in 1986. The ASU West campus concept was initiated by a citizens group in 1972 and was formally established as a campus by legislation in 1984.

NORTHERN ARIZONA UNIVERSITY HISTORY

NAU was established in 1889 as Northern Arizona Normal School and the name was changed to Northern Arizona State Teachers College in 1925. The name was again changed to Arizona State College at Flagstaff in 1945, and finally designated Northern Arizona University in 1966. The first non-education degree was added in 1958 (forestry). The first graduate program was begun in 1937, with the first doctoral student graduated in 1973. The Ralph M. Bilby Research Center, a multidisciplinary research facility, was dedicated in 1981.

UNIVERSITY OF ARIZONA HISTORY

The UA was established in 1885 as the land grant university under the Morrill Act, thus enabling federal funds to assist the two initial Colleges of Agriculture and Mines. The College of Education was added in 1922. By 1949, there were eight colleges, in addition to the Graduate College established in 1934. The Agricultural Experiment Station was established in 1890, the Arizona State Museum in 1893, the Cooperative Extension Service in 1914, and the Engineering Experiment Station in 1941. The name University of Arizona has been in existence since its establishment.

ARIZONA COMMUNITY COLLEGES HISTORY

The first community college in Arizona was Eastern Arizona College in Thatcher. It was established as St Joseph Stake Academy in 1888 and also provided high school education. It became non-sectarian in 1933, and was designated Eastern Arizona College in 1920. The second community college was established as Phoenix Junior College in 1920, and renamed Phoenix College in 1939. In 1960, the Arizona Legislature passed a law establishing a community college system for Arizona, and established the Arizona Junior College Board. The governing board was changed to the State Board of Directors for Arizona Community Colleges in 1972. Community colleges in Arizona now comprise nine districts with 15 individual campuses.

FACULTY RELATED TRENDS

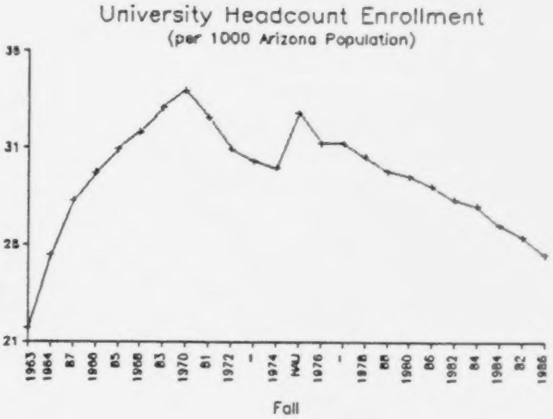
Nationally, higher education began to grow rapidly in the mid 1950s. With a typical 40-year career, expectations are that we will see sizable retirements of faculty in the mid 1990s. However, these faculty age distributions will vary by the institution, and are related to the type of institution, the rate of institutional change, and the type of faculty being attracted or lost to other universities. Here too, the Arizona universities differ (Figures A1, A2, A3). The University of Arizona has a more even distribution of faculty age, and a higher proportion of over 65 than the other two universities. Most faculty at UA are in the age range 33 to 61, at NAU and ASU they are in the range 38 to 57.

STUDENT RELATED TRENDS

OVERALL ENROLLMENT CHANGES

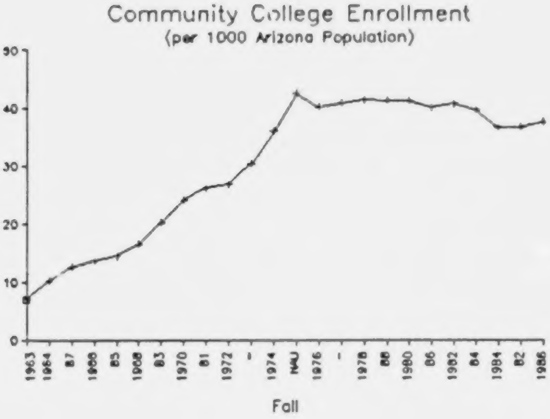
The per capital enrollment of the Arizona universities increased until about 1970, declined until a short lived increase around 1975, and has declined over the last decade (Figure 3).

Figure 3. Arizona Universities Enrollment per Capita population



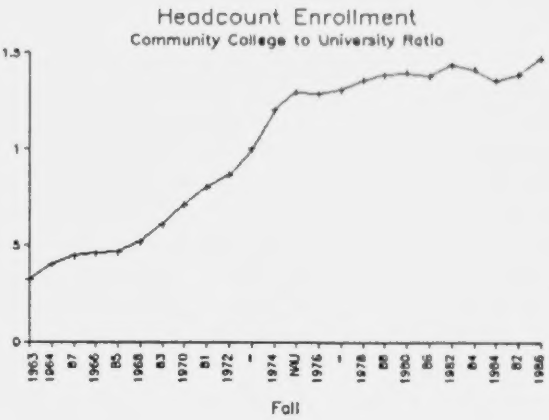
A similar change in enrollment per capita was seen in the growth of community colleges in Arizona, with an increase until about 1975, and a relatively no change in the last decade (Figure 4).

Figure 4. Arizona Community Colleges Enrollment per Capita



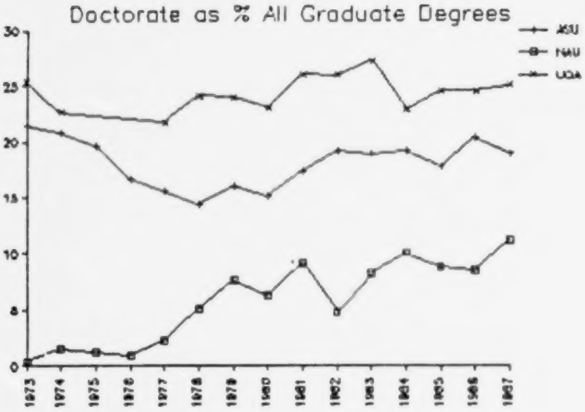
The effect of the community colleges on university enrollments and the significance of the mid 1970s time period can be seen in Figure 5. The ratio of community college enrollments to university enrollments increased until about 1975 and has remained relatively constant in the last decade.

Figure 5. Community College to University Enrollment Ratio



The changing research emphasis can also be seen with the relative amount of doctoral degrees as a percent of all graduate degrees granted by each Arizona university. Over the last 15 years, the overall graduate degree ratio has been about the same (except for NAU where increase has been significant, and includes increases in the number of part-time, off-campus graduate students). However, during this period there have been shifts in the ratio (Figure 6).

Figure 6. Doctorate as Percent of All Graduate Degrees



STUDENT GROWTH RATES BY TYPE OF STUDENT

University enrollments are defined by on- and off-campus, full- and part-time, graduate and undergraduate, upper and lower division, and resident or non-resident students. The Arizona universities differ in the manner in which some of these data are defined, so exact comparison of trends among institutions is not simple. However, in general, ASU has grown more rapidly (passing UA in total headcount enrollment in FY 1968-69, and NAU has grown more rapidly in graduate enrollment (mostly off-campus). During the 20-year period 1955 to 1975 the Arizona universities had continuing growth, but in the decade 1975 to 1984 the enrollment and credit hours were essentially stable. It is only in the last three years (1984 to 1987) that enrollment began to increase rapidly, and then only for ASU and UA, primarily from increases in non-resident students (Tables 1-4).

Table 1. Arizona State University Enrollment Trends

Year (Fall)	1980	1981	1982	1983	1984	1985	1986	1987
Resident								
UG	15331	16127	17971	18998	18937	18625	18819	20044
GR	1872	1872	1967	1956	1847	1851	1936	5603
Total	17203	17999	19938	20954	20784	20476	20755	25647
Non-Resident								
UG	8155	7613	6798	6819	6915	7073	7433	8984
GR	1138	1289	1288	1322	1306	1316	1476	2967
Total	9293	8902	8086	8141	8221	8389	8909	11951
Unclassified								
UG	4263	4461	4579	4438	5776	4144	4831	702
GR	7069	7228	6716	6706	8028	7579	7045	2758
Total	11332	11689	11295	11144	13804	11723	11876	3460
Overall Total								
UG	27749	28201	29348	30255	31628	29842	31083	29730
GR	10079	10389	9971	9984	11181	10746	10457	11328
Total	37828	38590	39319	40239	42809	40588	41540	41058
Percentages trends:								
FT NonRes	35.1	33.1	28.9	28.0	28.3	29.1	30.0	31.8
Unclass	30.0	30.3	28.7	27.7	32.2	28.9	28.6	8.4
Tot Grad	26.6	26.9	25.4	24.8	26.1	26.5	25.2	27.6
FT Grad	11.4	11.8	11.6	11.3	10.9	11.0	11.5	22.8

FT NonRes is proportion of full time students that are non-resident; Unclass is percent of unclassified students of all students and is based on Headcount; definitions by tuition and fees. Unclassified = unknown residency or less than 7 units. Source: Arizona Board of Regents

Table 2. Northern Arizona University Enrollment Trends

Year (Fall)	1980	1981	1982	1983	1984	1985	1986	1987
Resident								
UG	8083	7770	7555	7303	7017	7231	7382	7487
GR	462	416	561	787	891	1050	384	514
Total	8545	8186	8116	8090	7908	8281	7766	8001
Non-Resident								
UG	1607	1524	1403	1531	1736	1757	1939	1919
GR	68	204	203	228	275	236	215	237
Total	1675	1728	1606	1759	2011	1993	2154	2156
Unclassified								
UG	740	1021	791	718	750	864	1205	1000
GR	1114	1188	1152	934	1157	1477	2083	2288
Total	1854	2209	1943	1652	1907	2341	3288	3288
Overall Total								
UG	10430	10315	9749	9552	9503	9852	10526	10406
GR	1644	1808	1916	1949	2323	2763	2682	3039
Total	12074	12123	11665	11501	11826	12615	13208	13445
Percentage trends:								
FT NonRes	16.4	17.4	16.5	17.9	20.3	19.4	21.7	21.2
Unclass	15.4	18.2	16.7	14.4	16.1	18.6	24.9	24.5
Tot Grad	13.6	14.9	16.4	16.9	19.6	21.9	20.3	22.6
FT Grad	5.2	6.3	7.9	10.3	11.8	12.5	6.0	7.4

FT NonRes is proportion of full time students that are non-resident; Unclass is percent of unclassified students of all students and is based on Headcount; definitions by tuition and fees. Unclassified = unknown residency or less than 7 units. Source: Arizona Board of Regents

Table 3. University of Arizona Enrollment Trends

Year (Fall)	1980	1981	1982	1983	1984	1985	1986	1987
Resident								
UG	16049	16481	16594	16621	16325	16407	14758	17013
GR	3661	3725	3941	3828	3841	3772	1584	3505
Total	19710	20206	20535	20449	20166	20179	16342	20518
Non-Resident								
UG	5759	5439	5036	4757	4700	5102	6296	6430
GR	1536	1493	1453	1377	1547	1586	1753	1438
Total	7295	6932	6489	6134	6247	6688	8049	7868
Unclassified								
UG	1533	1731	1585	1577	1561	1602	2889	1711
GR	1903	1917	1683	1826	1753	1905	3799	2408
Total	3436	3648	3268	3403	3314	3507	6688	4119
Overall Total								
UG	23341	23651	23215	22955	22586	23111	23943	25154
GR	7100	7135	7077	7031	7141	7263	7136	7351
Total	30441	30786	30292	29986	29727	30374	31079	32505
Percentage trends:								
FT NonRes	27.0	25.5	24.0	23.1	23.7	24.9	33.0	27.7
Unclass	11.3	11.8	10.8	11.3	11.1	11.5	21.5	12.7
Tot Grad	23.3	23.2	23.4	23.4	24.0	23.9	23.0	22.6
FT Grad	19.2	19.2	20.0	19.6	20.4	19.9	13.7	17.4

FT NonRes is proportion of full time students that are non-resident; Unclass is percent of unclassified students of all students and is based on Headcount; definitions by tuition and fees. Unclassified = unknown residency or less than 7 units. Source: Arizona Board of Regents

The non-resident enrollment varies among the universities and by class within the university. Those non-residents taking less than seven units are non classified as non-resident, as the definition is based on tuition payments. The most recent distribution of non-residents is listed in Table 4.

Table 4. Arizona Universities Non-Resident Enrollment for Fall 1987

Type	ASU(%)	NAU(%)	UA(%)
Undergraduate			
Freshman	47	22	42
Sophomore	36	23	36
Junior	24	24	26
Senior	17	17	20
Subtotal	30	20	32
Graduate	44	32	53
Overall	31	21	35

All FULL TIME students (7 or greater units) for tuition purposes. Non-resident includes foreign students. Class breakout was first available in Fall 1986.
Source: Arizona Board of Regents

INSTRUCTIONAL DISTRIBUTION BY COLLEGES WITHIN UNIVERSITY

There are two ways to take a "snapshot" of the university, and both will be presented. First, looking at the distribution of activities based on the structure of the university, and second by comparing the activities by subject area and comparing to national averages. This section presents the analysis by organization within the Arizona universities. In Tables 5-7 below, SCH is student credit hours (the number of students taking specific units loads), UG is undergraduate, GR is graduate, BS is all bachelor degrees, MS is all masters degrees, and PhD is all doctoral degrees (except medicine). The number of faculty is the headcount of tenure/tenure-track faculty and research funds are non-budgeted (non-state) sponsored projects funding of all types. All entries are in percent distribution within the university, except for the Total line.

Table 5. Arizona State University Comparative College Data

College	% UG SCH	% GR SCH	% BS	% MS	% PhD	% Faculty	% Research
Arch/Env Design	2.5	2.0	2.6	2.9	-	2.9	.1
Business	16.6	11.8	33.5	19.2	13.7	13.7	1.1
Education	4.1	21.7	9.6	24.0	32.2	6.6	7.9
Eng/App Sci	9.3	18.2	14.9	18.5	14.4	17.1	28.9
Fine Arts	7.2	5.6	4.5	7.1	4.1	8.9	.8
Law	-	11.7	-	-	-	1.7	.2
Lib Arts/Sci	51.7	18.4	22.5	14.4	33.6	40.5	37.8
Nursing	1.0	1.6	2.9	2.5	-	3.1	1.5
Public Programs	7.2	3.4	9.5	4.7	1.4	4.7	.1
Social Work	.4	5.5	.9	6.7	.7	1.5	.2
Other	-	-	-	-	-	-	21.4
Total	395286	57734	5276	1115	146	1755	39220

SCH FY 88 degrees and research FY87. Dollars in thousands. Education degrees in a discipline are counted in education.
Source: Arizona State University

Table 6. Northern Arizona University Comparative College Data

College	% UG SCH	% GR SCH	% BS	% MS	% PhD	% Faculty	% Research
Arts/Science	34.6	19.9	16.7	15.6	17.7	37.8	12.7
Business Admin	12.7	3.1	22.0	6.6	-	10.3	.1
Ctr Excel Educa	6.6	59.2	9.0	60.1	82.3	9.7	11.6
Cre Comm Arts	18.0	3.9	13.3	7.0	-	14.2	5.1
Design/Tech	-	-	6.1	6.8	-	-	.3
Engin/Tech	5.8	-	11.3	-	-	6.2	1.4
Forestry	.8	1.6	2.2	.9	-	3.3	5.7
Health Prof	5.2	2.0	11.7	4.8	-	6.2	.2
Hotel Mgmt	1.5	-	3.0	-	-	1.2	-
Inst Human Dev	-		-	-	-	-	20.6
Soc Behav Sci	14.60	10.30	10.80	5.70	-	11.30	5.90
Spon Research	-		-	-	-	-	1.1
Other	.3	-	-	-	-	-	13.9
Total	144017	14234	1438	456	62	487	8520

Includes on- and off-campus instruction. Faculty and SCH data FY 88 other data FY 87. Dollars in thousands.
Source: Northern Arizona University

Table 7. University of Arizona Comparative College Data

College	% UG SCH	% GR SCH	% BS	% MS	% PhD	% Faculty	% Research
Agriculture	4.3	7.2	7.5	10.9	17.6	5.5	8.5
Architecture	1.4	.4	2.1	.1	-	1.8	.1
Education	3.6	10.4	5.9	18.0	16.9	6.4	2.8
BPA	13.7	10.3	26.5	10.4	3.8	9.6	2.3
Engineer/Mines	7.5	11.0	15.3	16.6	10.3	12.9	11.2
Fine Arts	7.2	4.0	6.9	4.4	.3	7.8	.3
Humanities	16.5	4.3	4.1	2.7	2.1	10.0	.7
Sciences	20.6	14.9	7.0	12.0	23.8	20.4	40.3
Soc Behav Sci	20.9	11.9	14.0	14.7	12.8	17.2	2.4
Nursing	.9	1.9	2.6	2.2	2.4	3.8	1.2
Pharmacy	.8	1.8	1.4	1.5	2.8	2.4	3.3
Sch Health RP	2.2	1.8	1.7	2.1	-	2.5	.6
Other Res Units	-	4.0	-	2.6	4.1	-	11.9
Other units							14.4
Total	341892	41978	3570	1209	290	1211	97810

Medicine not included. SCH and faculty data for FY87; Research/degrees FY 87 FY o8. University departments reported in Science (Biochemistry, Molecular and Cellular Biology, Microbiology and Immunology). 154 professional degrees not listed (132 in Law). Cooperative Extension and farms not included. Other Research Units are Arizona Research Laboratories Environmental Research Laboratory, and Optical Sciences.
Source: University of Arizona.

DISTRIBUTION OF GRADUATE DEGREES BY ORGANIZATION

Trend comparisons for sponsored research funding and graduate degrees are shown for two years by organizational units in Tables 8-10. Differences in units that have large amounts of sponsored funding and low numbers of graduates indicate contract oriented research, rather than research for direct graduate training.

Table 8. Arizona State University Graduate Degrees

Department/Unit	FY87 Funds	FY86 Funds	FY 87 PhD	FY86 PhD	FY87 MS	FY86 MS	Total All Degs
Arch Env Design	55	113	0	0	32	23	55
Business	419	289	20	17	214	258	509
Education	3097	2675	47	67	278	274	666
Engineering	11341	14065	21	13	206	207	447
Fine Arts	309	2	6	6	79	76	167
Liberal Arts/Sciences	14813	12762	49	50	161	138	398
Nursing	581	553	0	0	28	26	54
Public Programs	51	323	2	3	52	56	113
Social Work	70	66	1	0	75	59	135
Other	8411	2590					0
							0
Total	39147	33438	146	156	1125	1117	2544

Note: College of Law not included. Other category is administrative and non listed units. FY 87 funds "other" inculdes $5 million for planning and construction. Source: Arizona State University.

Table 9. Northern Arizona University Graduate Degrees

Department/Unit	FY87 Res	FY86 Res	FY 87 PhD	FY86 PhD	FY87 MS	FY86 MS	Total All Degs
Ctr Excell Educ	1205	991	51	34	274	256	615
Arts and Sciences	2906	1085	11	7	71	72	161
Business Admin	2	9	0	0	30	27	57
Design Tech	20	27	0	0	31	24	55
Social Behav Sciences	313	501	0	0	23	25	48
Creat/Comm Arts	24	439	0	0	32	14	46
Health Professions	440	15	0	0	22	17	39
Forestry	569	485	0	0	4	. 4	8
AZ CTR Vocational Ed	2355	1811					0
Inst for Human Devel	2310	1758					0
Sponsored Research	601	96					0
Admin and Finance	298	561					0
Engineer Tech	170	120					0
Other	1	622					0
Total	11214	8520	62	41	487	439	1029

Note: Office of President; research funds rounded to nearest 1000
Sort: By total MS and PhD degrees for two years, followed by FY 87 Research
Percent of two year research in non degree areas as percent of total (FY 87 and FY 86 is 54.2%). Source: Northern Arizona University

Table 10. University of Arizona Graduate Degrees

Department/Unit	FY 87 Funds	FY 86 Funds	FY 87 PhD	FY86 PnD	FY87 MS	FY86 MS	Total All Degs
Agriculture	8305	8842	51	45	132	217	445
Architecture	25	6	0	0	1	9	10
Business/Public Adm	2268	3607	11	9	158	126	304
Education	2780	2129	49	41	224	199	513
Engineering/Mines	10919	10655	30	24	201	174	429
Fine Arts	332	31	1	1	68	57	127
Health Rel Profs	566	479	0	0	25	62	87
Humanities	728	245	6	4	33	52	95
Nursing	1176	850	7	7	27	44	85
Pharmacy	3197	4698	11	8	18	12	49
Sciences	39453	23908	69	51	145	137	402
Social Behav Sci	2441	1710	37	32	178	161	408
Sponsored Research Administrative	11593	12343	0	0	0	0	0
Total			272	222	1210	1250	2954

Does not include Colleges of Medicine or Law; Professional degrees included in Masters (Education, Nursing). Some research units award degrees through other academic depts (e.g., Optical Science through Engineering); some research units are effectively joint with academic units (e.g., Arizona Research Laboratories). Source: University of Arizona.

DISTRIBUTION OF DEGREES BY SUBJECT AREA

This comparison is by HEGIS[4] classification code, for comparison to national averages. The degree comparisons in Tables 11-13 include a two year summary distribution of the Arizona universities (FY 86 and FY 87) with national distribution for FY 85. Those categories where the Arizona university is less than one third the national average are indicated by a L and those where the Arizona university is greater by one third of the national average are indicated by a G.

Table 11. Bachelor's Degrees: Arizona vs National Distribution

Category	National %	ASU	NAU	UA
Agriculture/Renewable Nat Resources	1.85	L		G
Architecture/Environ Design	.95	G	L	G
Area and Ethnic Studies	.29	L	L	G
Business and Management	23.82			
Communications	4.30	G	L	
Computer/Information Sciences	3.97		G	L
Education	9.00		G	
Engineering	7.88		L	G
Engineering/Related Technologies	1.93	G	G	L
Foreign Languages	1.02	G	L	G
Health Sciences	6.59			
Home Economics	1.59			G
Letters	3.48	L		
Life Sciences	3.93	L		
Mathematics	1.55	L		G
Multi/Interdisciplinary	1.61	L	G	G
Parks and Recreation	.47	G	G	L
Philosophy and Religion	.65	L	L	
Physical Sciences	2.42	L	G	
Psychology	4.06		L	
Protective Services	1.28	G	G	L
Public Affairs	1.41		L	L
Social Sciences	9.34		L	
Visual/Performing Arts	3.87			

Arizona is total of 2-yr of Bachelor's Degrees (FY 86 and FY 87); National is FY 85 (some categories combined) where classification changes were made. Less (L) or Greater (G) is the Arizona university is outside of +/- 33% of national average.

Table 12. Master's Degrees: Arizona vs National Distribution

Category	National %	ASU	NAU	UA
Agriculture/Nat Resources	1.37		L	G
Architecture/Environ Design	1.14	G	L	
Area and Ethnic Studies	.31	L	L	G
Business and Management	23.59		L	
Communications	1.28		L	
Communications Tech	.07	G	L	L
Computer/Information Sciences	2.48		L	
Education	26.60		G	
Engineering	7.31	G	L	G
Engineering/Related Technologies	.22	G	L	L
Foreign Languages	.60		L	G
Health Sciences	6.07	G	L	
Home Economics	.83	L	L	G
Letters	2.07	L	G	G
Library	1.36	L	L	G
Life Sciences	1.77	L	G	G
Mathematics	1.01	L	G	
Multi/Interdisciplinary	1.11		L	L
Parks and Recreation	.19		L	L
Philosophy and Religion	.41	L	L	
Physical Sciences	2.02		G	G
Protective Services	.43	G	G	L
Psychology	2.94	L	L	L
Public Affairs	5.61	G	L	L
Social Sciences	3.63		G	
Visual/Performing Arts	3.04	G	G	

Arizona is total of 2-yr of Master's Degrees (FY 86 and FY 87); National is FY 85 (some categories combined) where classification changes were made. Less (L) or Greater (G) is the Arizona university is outside of +/- 33% of national average.

Table 13. Doctoral Degrees: Arizona vs National Distribution

Category	National %	ASU	NAU	UA
Agriculture/Natural Resources	3.68	L	L	G
Architecture/Environ Design	.27	L	L	L
Area and Ethnic Studies	.42	L	L	G
Business and Management	2.63	G	L	
Communications	.69	L	L	L
Communications Tech	.02	G	L	L
Computer/Information Sciences	.75	L	L	
Education	21.71	G	G	
Engineering	9.78		L	
Foreign Languages	1.33	L	L	L
Health Sciences	3.64	L	L	G
Home Economics	.84	L	L	L
Letters	3.76		L	
Library Science	.26	L	L	L
Life Sciences	10.42	L		G
Mathematics	2.12	L	L	G
Multi/Interdisciplinary	.87	L	L	G
Parks and Recreation	.11	L	L	L
Philosophy and Religion	1.42	L	L	L
Physical Sciences	10.33	L	L	G
Protective Services	.10	L	L	L
Psychology	8.83	L	L	L
Public Affairs	1.31	G	L	L
Social Sciences	8.66	G		L
Visual/Performing Arts	2.10	G	L	G

Arizona is total of 2-yr of Doctoral Degrees (FY 86 and FY 87); National is FY 85 (some categories combined) where classification changes were made. Less (L) or Greater (G) is the Arizona university is outside of +/- 33% of national average.

A full listing of the actual number of degrees awarded and their percentage distribution for each Arizona University is found in Tables A2-A4, at the end of this report.

RESEARCH RELATED DATA

Sponsored Projects funding provided by external agencies is also an indicator of university activities in the research area. Sponsored projects include all funds that are not state budgeted and are provided by external organizations (including State of Arizona through means other than university budget processes). The sponsored projects categories are shown in Table 14.

SPONSORED PROJECTS BY ARIZONA BUDGET CATEGORY

Table 14. Sponsored Projects at Arizona Universities (FY 87 Awards

	- Thousands Dollars -			---- Percentage ----		
Category	ASU	NAU	UA	ASU	NAU	UA
Instruction	2113	2072	4857	5.4	15.7	3.5
Research	23105	2094	118010	58.9	15.9	84.2
Public Service	4790	3247	6079	12.2	24.6	4.3
Academic Support	1680	82	2905	4.3	.6	2.1
Student Support	204	385	1571	.5	2.9	1.1
Financial Aid	358	5245	6352	.9	39.8	4.5
Institutional Support	6970	67	372	17.8	.5	.3
Total	39220	13192	140146			

Note: For NAU, $33,000 maintenance is included in institutional support; For ASU, $1,680,000 equipment is included in academic support. Source: Arizona State University, Northern Arizona University.

RESEARCH ACTIVITIES BY NSF CATEGORIES

The National Science Foundation analyzes a number of aspects of graduate education, but several subject fields are not included in their analyses. These do not include education as a category (this impacts greatest on NAU in the listings below); see Tables 15-18.

Table 15. Arizona State University Research Distribution

NSF summary Dollars in Thousands

FY 86 Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	423	603	58.77	9	2599	3546	12109	29.28
Phys Sci	6	174	96.67	47	178	4450	8932	49.82
Environ Sci	14	51	78.46	8	0	1823	3064	59.50
Math/Comp Sci	131	135	50.75	0	0	291	586	49.66
Life Sci	207	193	48.25	0	0	1815	3286	55.23
Psychology	0	96	100.00	1	0	891	1098	81.15
Social Sci	326	370	53.16	4	0	725	2579	28.11
Other	0	0	.00	0	0	0	1926	.00
Total	1107	1622	59.44	69	2777	13541	33580	40.32

Source: National Science Foundation

Table 16. Northern Arizona University Research Distribution

FY 86 Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	0	0	.00	0	0	17	70	24.29
Phys Sci	1	5	83.33	0	0	6	121	4.96
Environ Sci	20	51	71.83	0	0	35	245	14.29
Math/Comp Sci	2	16	88.89	0	0	0	53	.00
Life Sci	25	101	80.16	1	0	725	1333	54.39
Psychology	204	100	32.89	0	0	299	343	87.17
Social Sci	49	38	43.68	0	0	16	100	16.00
Other	0	0	.00	0	0	3	3	100.00
Total	301	311	50.82	1	0	1101	2268	48.54

Note: NSF categories do not include "education" and this impacts NAU to a greater degree than the other universities; it also causes different figures for NSF summaries and university summaries of the same types of data (Tables 5-10). Source: National Science Foundation

Table 17. University of Arizona Research Distribution

FY 86 Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	221	640	74.33	3	8053	4925	10249	48.05
Phys Sci	26	446	94.49	82	1502	19842	32927	60.26
Environ Sci	96	407	80.91	1	564	3854	14835	26.05
Math/Comp Sci	78	335	81.11	4	190	2641	2897	91.16
Life Sci	143	888	86.13	139	17016	28447	56594	50.27
Psychology	0	68	100.00	1	16	53	147	36.05
Social Sci	93	392	80.82	0	332	2201	6923	31.79
Other	0	0	.00	0	3464	0	218	.00
Total	657	3176	82.86	230	31137	61973	124790	49.66

Source: National Science Foundation

Table 18. Arizona Universities Research Distribution

ALL 3 UNIVERSITIES TOTAL: FY 86

Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	644	1243	65.87	12	10652	8488	22428	37.85
Phys Sci	33	625	94.98	129	1680	24298	41980	57.88
Environ Sci	130	509	79.66	9	564	5722	18144	31.54
Math/Comp Sci	211	486	69.73	4	190	2932	3536	82.92
Life Sci	375	1182	75.92	140	17016	30987	61213	50.62
Psychology	204	264	56.41	2	16	1243	1588	78.27
Social Sci	468	800	63.09	4	332	2942	9602	30.64
Other	0	0	.00	0	3464	3	2147	.14
Total	2065	5109	71.22	300	33914	76615	160638	47.69

Source: National Science Foundation

The information on research and development expenditures categorized by the National Science Foundation are also useful to track the rates of change of all sponsored project activities, in either absolute dollar amounts or ratios of the Arizona institutions to all institutions. These trends are summarized in Tables 19-21.

Table 19. Arizona State University: NSF R&D Trends

Fiscal Years

Category	82	83	84	85	86
Engineering	3113	7142	7424	10906	12109
Phys Sci	3693	5586	5279	7287	8932
Environ Sci	1035	2408	2424	2416	3064
Math/Comp Sci	437	380	306	446	586
Life Sci	1137	1925	1556	2508	3286
Psychology	380	640	496	1032	1098
Social Sci	1716	2599	2734	2711	2579
Other	0	1614	1830	1647	1926
Total ASU	11511	22294	22049	28953	33580
Total NSF	7266	7798	8508	9524	10718
ASU/NSF	1.58	2.86	2.59	3.04	3.13

ASU/NSF ratio times 1000; NSF total in thousands, ASU entries in actual funding.
Source: National Science Foundation

Table 20. Northern Arizona University: NSF R&D Trends
Fiscal Years

Category	82	83	84	85	86
Engineering	129	135	178	211	70
Phys Sci	84	43	61	59	121
Environ Sci	77	89	96	239	245
Math/Comp Sci	18	11	21	0	93
Life Sci	623	669	998	1227	1333
Psychology	9	0	5	0	343
Social Sci	377	204	276	67	100
Other	0	23	189	314	3
Total NAU	1317	1174	1824	2117	2308
Total NSF	7266	7798	8508	9524	10718
NAU/NSF	.18	.15	.21	.22	.22

NAU/NSF ratio times 1000; NSF total in thousands, NAU entries in actual funding.
Source: National Science Foundation

Table 21. University of Arizona: NSF R&D
Fiscal Years

Category	82	83	84	85	86
Engineering	6440	6287	7020	7864	10249
Phys Sci	18332	20212	24338	26117	32927
Environ Sci	14581	13148	12269	14049	14835
Math/Comp Sci	1174	984	1092	2174	2897
Life Sci	41637	42105	43146	48508	56594
Psychology	769	863	823	210	147
Social Sci	4890	5402	6258	6783	6923
Other	0	23	189	314	3
Total UA	87823	89024	95135	106019	124575
Total NSF	7266	7798	8508	9524	10718
UA/NSF	12.09	11.42	11.18	11.13	11.62

ASU/NSF ratio times 1000; NSF total in thousands, ASU entries in actual funding.
Source: National Science Foundation

The National Science Foundation summaries can also show the changing emphases of the Arizona universities relative to concentration of sponsored projects funding (as reported by NSF) by subject area. The total for all Arizona universities in shown in Figure 7 (the categories are the same as those listed in Table 22).

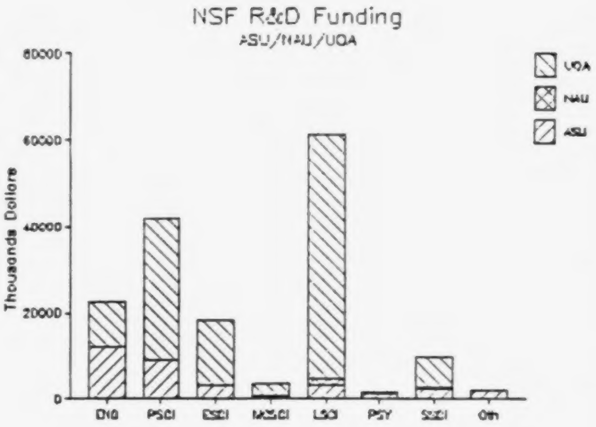
Table 22. Relative Portion of National Research by Arizona Universities

NSF R&D BY Category FY 86

Category	National Total	UA	ASU	NAU	Ratio UA/ASU	UA+ASU % Total
Total	10,718,402	124,790	33,580	2,308	3.7	1.5
Engineering	1,609,093	10,249	12,109	70	.8	1.4
Physical Sci	1,261,376	32,927	8,932	121	3.7	3.3
Environ Sci	774,177	14,835	3,064	245	4.8	2.3
Math/Computer Sci	467,564	2,897	586	93	4.9	.7
Life Sci	5,746,125	56,594	3,286	1,333	17.2	1.0
Psychology	180,453	147	1,098	343	.1	.7
Social Sci	459,303	6,923	2,579	100	2.7	2.1
Other	220,311	218	1,926	3	.1	1.0

Source: National Science Foundation

Figure 7.Total National Science Foundation R&D for Arizona Universities



It is more important to look at trends than absolute levels of research funding, as the relative size of the funding pool varies greatly among the various categories (e.g., in FY 86, Life Sciences accounted for 53.5%, Engineering 15.0%, and Social Sciences 4.3%). The five year trend from FY 82 through FY 86 for each university is shown in Figures 8-10.

Figure 8. ASU R&D Funding Trends

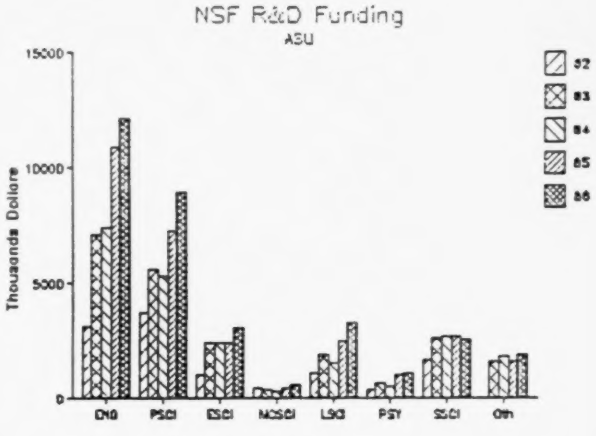


Figure 9. NAU R&D Funding Trends

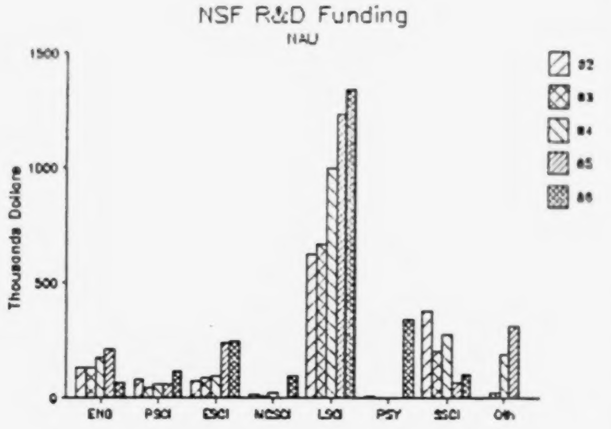
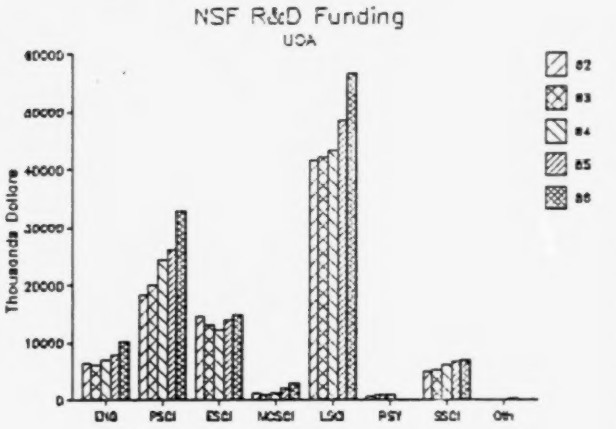


Figure 10. UA R&D Funding Trends



BUDGET DISTRIBUTION

The proportion of the state budget devoted to higher education has been declining in recent years. This is partly reflected in new needs competing for state funding, partly due to the population to university enrollment trends, and partly due to new financing of capital (see below). In the 25-year period 1963 to 1988, the overall university budgets grew an average of 1.5% annually after enrollment growth and inflation correction.[5]

CAPITAL CONSTRUCTION

In the last decade, there has been a slow shift for capital construction and acquisition from state funding to university bonding. This trend has accelerated in the last few years (Table 23).

Table 23. State Appropriations vs Bonding for Capital
(Millions of Dollars)

Years	Bonding	State Capital Appropriations
FY 68-73	6.4	62.0
FY 74-78	18.0	44.0
FY 79-83	142.0	51.0
FY 84-88	229.0	39.0
FY 89-93*	553.9	

*Planned expenditures via bonding authority.
Source: Arizona Board of Regents

PROGRAM EFFORTS

PROGRAM CHANGES AS INDICATORS OF UNIVERSITY EMPHASIS

The mechanism for developing the university state budgets for new programs is the "program change" process. The major focal areas of the universities, as identified by program change requests over the nine-year period FY 1981-FY 1989 are:[6]

ASU	Three subject areas account for 41 percent of all university requests: academic staff, engineering, and administrative staff.
ASU West	ASU West began as a separate budget in FY 85; all university requests consist of infrastructure subjects (academic and administrative staff, building support, and computing).

NAU Three subject areas account for 46 percent of all university requests: academic staff, computing, and general undergraduate.

UA Three subject areas account for 58 percent of all university requests: biological sciences, physical sciences, and engineering.

SUMMARY

There is a great deal of information that can be collected to help assess the degree to which the Arizona universities are in transition. This working paper collected a portion of that available information to identify some of the historical changes that have taken place. Rather than make a detailed summary of the differences or similarities of each institution, a series of tables and figures was presented to allow the reader to synthesize the type of analysis desired. While the types of information listed in this working paper can be used to identify historical shifts among the universities, it can also be used to identify to some degree the future directions that might be included for developing "focused excellence" within the institutions.

EXTERNAL TRENDS AS INDICATORS OF INTERNAL SHIFTS

The "Arizona Environmental Scan Study" and "Future Changes: Implications for Arizona's Universities" working papers catalog some anticipated changes in the state and nation that will impact the universities. As these changes occur, the universities will have to adjust their activities and areas of emphasis to remain competitive within their peer groups and to provide the higher educational needs for a growing state.

PERSPECTIVES GAINED IN PERSONAL INTERVIEWS

During our interviews with representatives of the three universities we found recognition of the types of transitions suggested in this working paper. The faculty and administrators of each of the campuses recognize the change related issues and resulting pressures on the institutions, but have different perceptions as to causes and responses. The internal trauma among university personnel due to these "transitions" should not be underestimated.

DEGREES AWARDED AS INDICATOR OF STUDENT INTEREST

There are several subjects areas where the Arizona universities differ from national averages in the types of degrees awarded. In addition, the individual universities have different histories and have significantly different areas of emphasis as defined by student degree distribution.

RESEARCH FUNDS RECEIVED AS INDICATOR OF RESEARCH EFFORT

The types of sponsored projects funds (all external monies received by the universities) as well as that portion designated "research" directly indicate the interests of the faculty, which indirectly indicate focal areas of the universities. By following the degree of change in various research categories, areas of research emphasis can be determined.

PROGRAM CHANGES REQUESTS AS INDICATOR OF PRIORITIES

Program Change requests is the mechanism used by the universities to make major changes to existing programs or to add new programs. The reasons could be to move in new directions, enhance existing programs, or address needs created by growth or other non-programmatic changes. By looking at the relative degree of emphasis in specific academic fields over time, the institutional focal areas can be identified indirectly.

ENROLLMENT PATTERNS AS INDICATOR OF STUDENT TRENDS

The Arizona universities have begun to grow in the last three years after about a decade of general stability in enrollments. The growth differs among the three universities, but generally is in off-campus and out-of-state students. The proportion due to graduate education generally has remained constant, except for increases in part-time, off-campus students.

CONCLUSIONS

There are clear areas of institutional emphasis, which differ by university, within the Arizona universities. These differences are identifiable by the types of degrees awarded within various subjects, and the relative distribution of externally generated research funds. These areas of emphasis are strongly influenced by the historical relationships and the geographical locations of the universities. Each university is in a "transition", but the degrees of change and the types of transition differ by each university. Some specific conclusions are:

1. The University of Arizona has a much longer history and of research and program diversity. This is reflected in the types of degrees offered and the types and amount of external research funding received. UA became a university in 1885 (103 years ago).

2. Arizona State University has undergone a greater degree of change than the other two universities in the last 30 years. This is reflected in its relative growth rate and the types of requests for new programs. ASU became a university in 1958 (30 years ago).

3. Northern Arizona University has begun to increase its research activities and relative graduate enrollment in the last decade. During this period the ASU and UA relative graduate enrollments remained stable or decreased slightly. NAU became a university in 1966 (22 years ago).

4. The University of Arizona is a more mature as reflected in the types of program change requests and longevity as a university. However, it is still developing in relation to and infrastructure and support services needs.

5. Arizona State University is in a major transition period. It must satisfy the desires and needs of a research university and also those of an urban university. This transformation is complicated by its rapid rate of change in the last 30 years in organization and program emphasis, the development of multiple campus centers or branch campuses, and its overall enrollment size.

6. Northern Arizona University is nearing a major crossroads in its development. The university is approaching a size and a stage of research emphasis where institutional character changes. The choices are to remain below this threshold and maintain much of its traditional character, or to pass through this threshold and become an entirely different institution.

7. Research growth by Arizona universities as a percentage of national research and development funds varies among the universities. Over the period FY 82 to FY 86, the University of Arizona is relatively constant, Northern Arizona University is increasing slowly, and Arizona State University is increasingly more rapidly. These rates of change reflect the size of the research effort (the larger the program size the slower the rate of change) and the developmental stage of the institution.

8. The distribution of each degree type (e.g., BS, MS, PhD) in each subject classification and the classifications of external research funding provide significant guidance in defining the current mission orientation of the Arizona universities. This guidance is further aided by comparing the distribution of degrees by subject matter for each Arizona university to the national averages for those subjects.

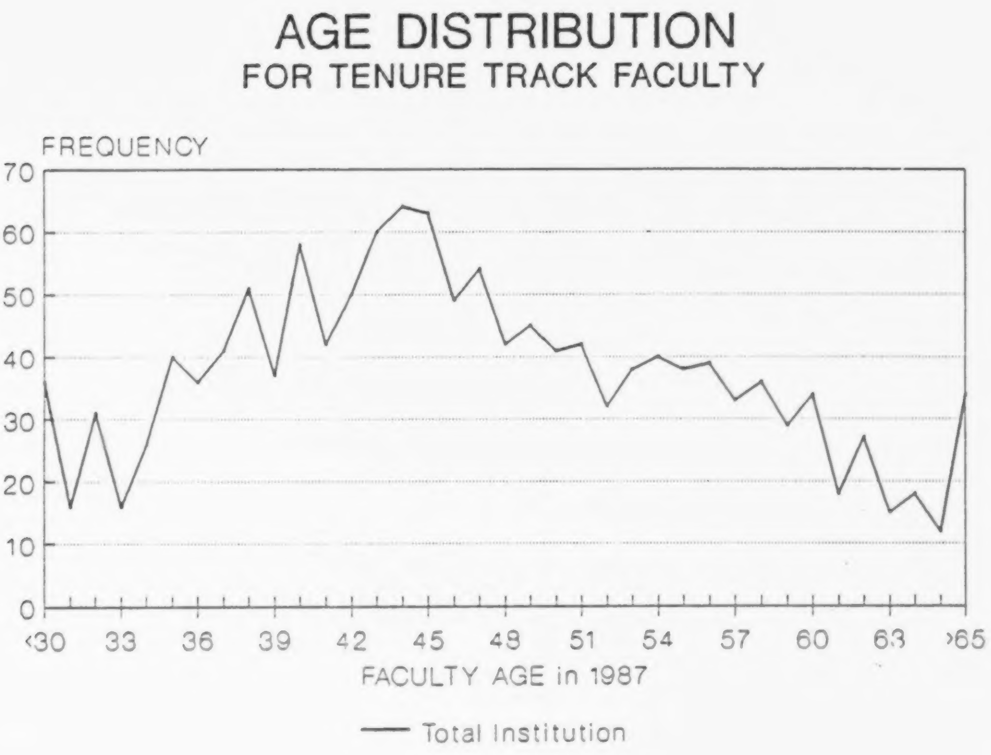
9. Each university has a different mix of degrees awarded by type of degree. The subject areas of undergraduate and graduate enrollment and research funding also is different for each university. This historical mix cannot be changed easily or rapidly and will impact the institutional movement to its vision of the campus of the future.

10. The Arizona universities likely will continue in a "transition" state over the next decade, so extrapolations of trends will be risky. The results of changing enrollment patterns over the last 20 years provides some indication of the importance of this observation. The shifts in demographic trends and changing type and rate of growth for Arizona in the next decade could have similar effects on such simple trend extraplations.

APPENDIX A

LARGE FIGURES AND TABLES

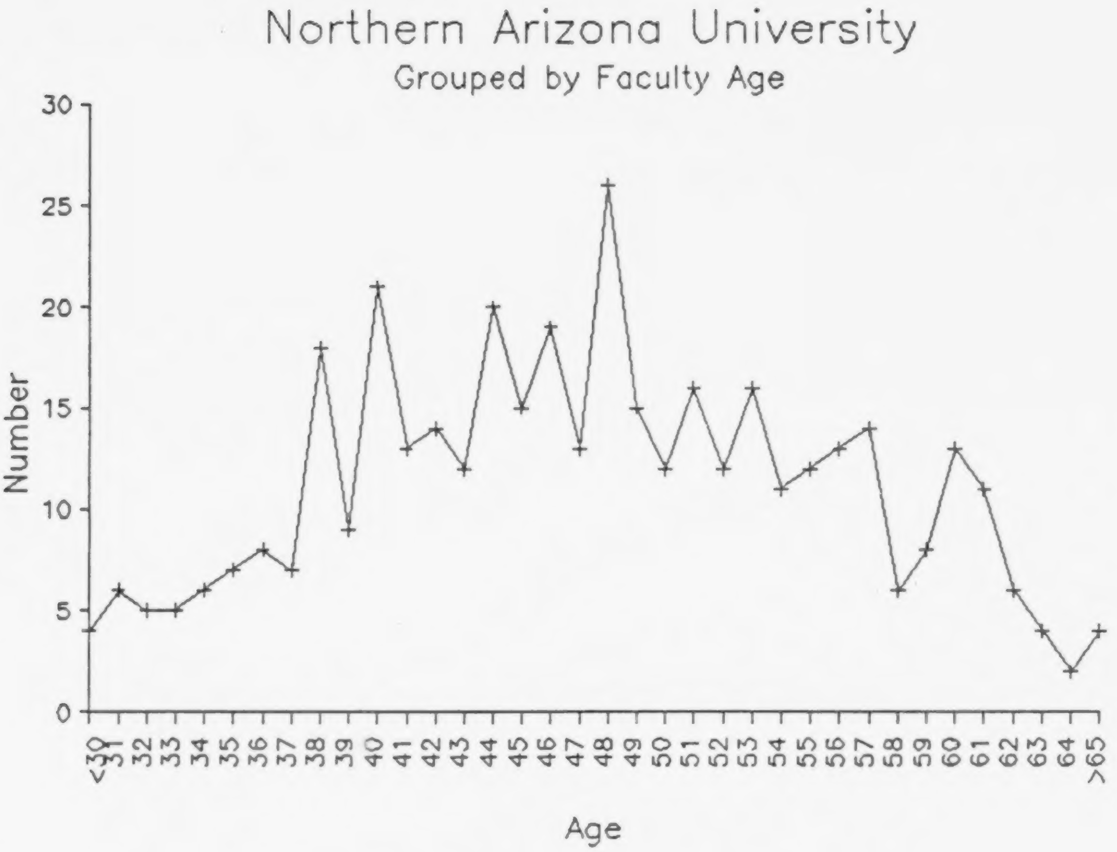
A1.ARIZONA STATE UNIVERSITY FACULTY AGE DISTRIBUTION



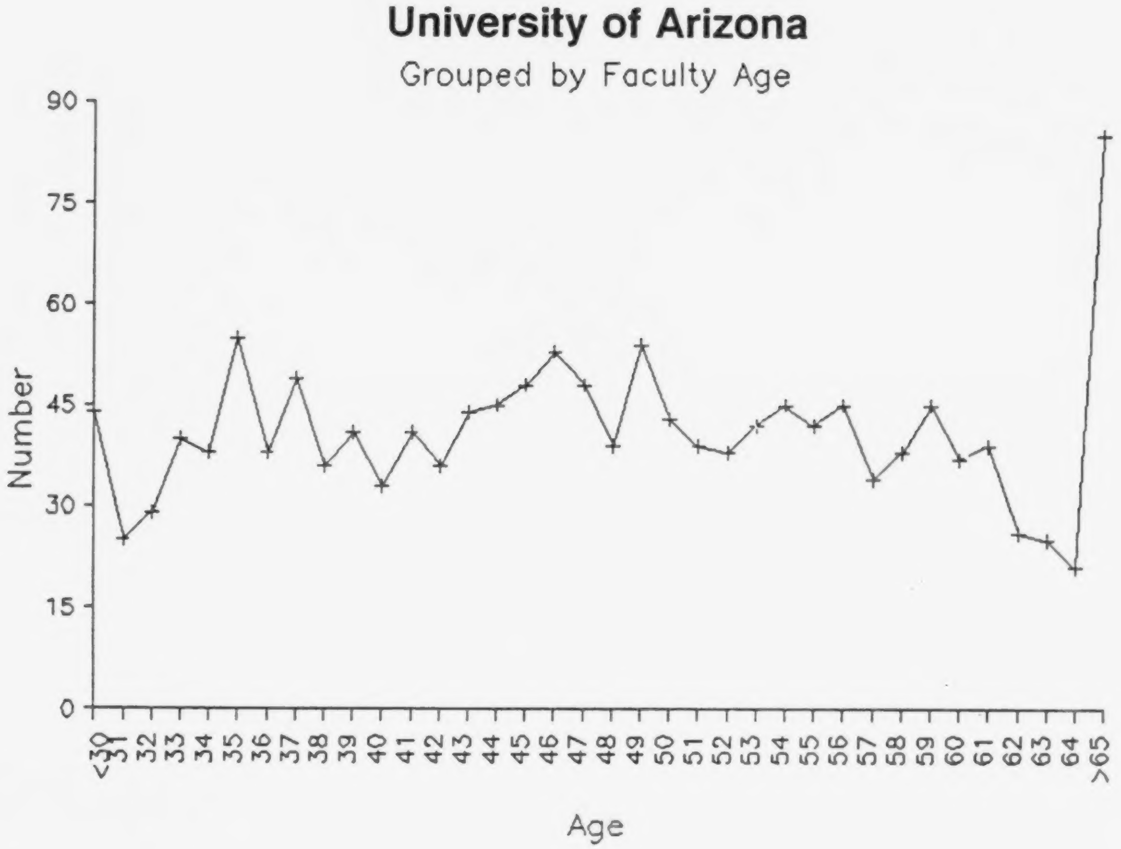
AGE DISTRIBUTION
FOR TENURE TRACK FACULTY

ASU Office of Institutional Analysis

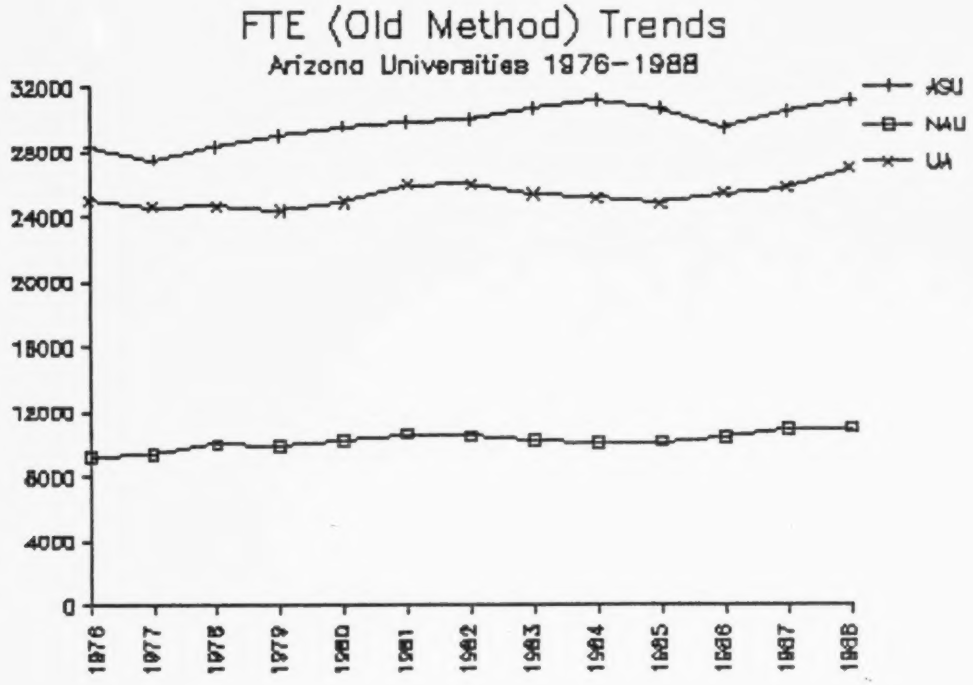
A2.NORTHERN ARIZONA UNIVERSITY FACULTY AGE DISTRIBUTION



A3.UNIVERSITY OF ARIZONA FACULTY AGE DISTRIBUTION



A4.ARIZONA UNIVERSITIES FTE TRENDS (OLD METHOD)



144

Table A1. Arizona Universities FTE Trends (Old Method)

Institution	1976	1977	1978	1979	1980	1981	1982
ASU	28260	27541	28321	28989	29581	29783	29984
NAU	9267	9417	10022	9868	10239	10675	10525
UA	25050	24607	24665	24386	24902	25959	26058
Total	62577	61565	63008	63243	64722	66417	66567

Institution	1983	1984	1985	1986	1987	1988
ASU	30629	31165	30703	29555	30474	31159
NAU	10220	10140	10158	10392	10973	11011
UA	25406	25184	24845	25438	25798	26976
Total	66255	66489	65706	65385	67245	69146

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* Old FTE method is Student Credit Hours divided by 15 for undergraduate and 10 for graduate students.
Source: Arizona Board of Regents

Table A2. Distribution of Bachelor's Degrees: All Universities

	Total of FY 86 and FY 87 BA/BS							
	ASU	NAU	UOA	ASU	NAU	UOA	Total	National
Category	#	#	#	%	%	%	%	%
Business and Management	3112	583	1801	30.28	19.07	25.39	26.91	23.82
Engineering	854	148	1061	8.31	4.84	14.96	10.10	7.88
Education	1107	416	514	10.77	13.61	7.25	9.97	9.00
Social Sciences	736	190	485	7.16	6.22	6.84	6.91	9.34
Communications	795	202	266	7.74	6.61	3.75	6.18	4.30
Health Sciences	419	130	346	4.08	4.25	4.88	4.38	6.59
Visual/Performing Arts	479	101	285	4.66	3.30	4.02	4.24	3.87
Life Sciences	193	101	340	1.88	3.30	4.79	3.10	3.93
Psychology	269	76	248	2.62	2.49	3.50	2.90	4.06
Computer/Information Sciences	363	163	0	3.53	5.33	.00	2.58	3.97
Letters	149	102	235	1.45	3.34	3.31	2.38	3.48
Multi/Interdisciplinary	13	138	305	.13	4.51	4.30	2.23	1.61
Engineering/Related Technologi	346	99	0	3.37	3.24	.00	2.18	1.93
Architecture/Environ Design	235	0	184	2.29	.00	2.59	2.05	.95
Physical Sciences	108	124	174	1.05	4.06	2.45	1.99	2.42
Home Economics	217	54	106	2.11	1.77	1.49	1.85	1.59
Protective Services	232	87	35	2.26	2.85	.49	1.73	1.28
Foreign Languages	143	11	141	1.39	.36	1.99	1.44	1.02
Allied Health	42	119	78	.41	3.89	1.10	1.17	.00
Agricultural Sciences	0	0	167	.00	.00	2.35	.82	.00
Voc Home Economics	0	37	121	.00	1.21	1.71	.77	.00
Mathematics	40	47	45	.39	1.54	.63	.65	1.55
Public Affairs	98	13	20	.95	.43	.28	.64	1.41
Parks and Recreation	71	51	4	.69	1.67	.06	.62	.47
Renewable Natural Resources	32	60	21	.31	1.96	.30	.55	.00
Industrial Arts	105	0	0	1.02	.00	.00	.51	.00
Agribusiness/Agri Production	64	0	22	.62	.00	.31	.42	1.85
Philosophy and Religion	20	5	35	.19	.16	.49	.29	.65
Area and Ethnic Studies	0	0	53	.00	.00	.75	.26	.29
Business and Office	34	0	0	.33	.00	.00	.17	.00
Total (2-yr of Bachelor Degree	10276	3057	7092	100.00	100.00	100.00	100.00	

National is FY 85 (some categories combined).
Source: UA Department of Education, Arizona Board of Regents.

Table A3. Distribution of Master's Degrees: All Universities

	Total of FY 86 and FY 87 Masters							
Category	ASU #	NAU #	UA #	ASU %	NAU %	UA %	Total %	National %
Education	523	448	654	22.03	60.38	25.31	28.51	26.60
Business and Management	425	57	255	17.90	7.68	9.87	12.93	23.59
Engineering	268	0	345	11.29	.00	13.35	10.75	7.31
Health Sciences	232	22	128	9.77	2.96	4.95	6.70	6.07
Visual/Performing Arts	166	33	96	6.99	4.45	3.72	5.18	3.04
Physical Sciences	34	30	203	1.43	4.04	7.86	4.68	2.02
Letters	76	45	102	3.20	6.06	3.95	3.91	2.07
Public Affairs	194	8	15	8.17	1.08	.58	3.81	5.61
Social Sciences	69	40	107	2.91	5.39	4.14	3.79	3.63
Life Sciences	23	25	99	.97	3.37	3.83	2.58	1.77
Library	3	0	126	.13	.00	5.31	2.26	1.36
Computer/Information Sciences	69	0	55	2.91	.00	2.13	2.18	2.48
Agricultural Sciences	0	0	86	.00	.00	3.33	1.51	1.37
Architecture/Environ Design	55	0	26	2.32	.00	1.01	1.42	1.14
Communications	28	0	41	1.18	.00	1.59	1.21	1.28
Engineering/Related Technologies	55	0	0	2.32	.00	.00	.96	.22
Foreign Languages	17	0	36	.72	.00	1.39	.93	.60
Home Economics	11	0	41	.46	.00	1.59	.91	.83
Psychology	25	7	18	1.05	.94	.70	.88	2.94
Renewable Natural Resources	12	4	24	.51	.54	.93	.70	.00
Mathematics	4	14	22	.17	1.89	.85	.70	1.01
Allied Health	0	0	38	.00	.00	1.47	.67	.00
Agribusiness/Agri Production	11	0	24	.46	.00	.93	.61	.00
Area and Ethnic Studies	0	0	29	.00	.00	1.12	.51	.31
Multi/Interdisciplinary	27	0	2	1.14	.00	.08	.51	1.11
Communications Tech	26	0	0	1.10	.00	.00	.46	.07
Protective Services	15	9	0	.63	1.21	.00	.42	.43
Philosophy and Religion	1	0	12	.04	.00	.46	.23	.41
Parks and Recreation	5	0	0	.21	.00	.00	.09	.19
Business and Office	0	0	0	.00	.00	.00	.00	.00
Voc Home Economics		0	0	.00	.00	.00	.00	.00
Industrial Arts		0	0	.00	.00	.00	.00	.00
Total (2-yr of Master's Degrees)	2374	742	2584	100.00	100.00	100.43	100.00	

National FY 85; some categories combined
Source: US Department of Education, Arizona Board of Regents

Table A4. Distribution of Doctoral Degrees: All Universities

	Total of FY 86 and FY 87 Doctor							
Category	ASU #	NAU #	UA #	ASU %	NAU %	UA %	Total %	National %
Education	109	85	91	40.37	82.52	16.37	30.68	21.71
Physical Sciences	14	0	96	5.19	.00	17.27	11.84	10.33
Life Sciences	11	10	72	4.07	9.71	12.95	10.01	10.42
Engineering	28	0	44	10.37	.00	7.91	7.75	9.78
Social Sciences	29	8	28	10.74	7.77	5.04	7.00	8.66
Business and Management	31	0	16	11.48	.00	2.88	5.06	2.63
Health Sciences	0	0	46	.00	.00	8.27	4.95	3.64
Agricultural Sciences	0	0	37	.00	.00	6.65	3.98	3.68
Psychology	15	0	22	5.56	.00	3.96	3.98	8.83
Letters	10	0	18	3.70	.00	3.24	3.01	3.76
Visual/Performing Arts	10	0	17	3.70	.00	3.06	2.91	2.10
Mathematics	0	0	16	.00	.00	2.88	1.72	2.12
Renewable Natural Resources	0	0	15	.00	.00	2.70	1.61	.00
Multi/Interdisciplinary	0	0	14	.00	.00	2.52	1.51	.87
Public Affairs	7	0	0	2.59	.00	.00	.75	1.31
Communications Tech	5	0	0	1.85	.00	.00	.69	.02
Allied Health	0	0	6	.00	.00	1.08	.65	.00
Area and Ethnic Studies	0	0	5	.00	.00	.90	.54	.42
Foreign Languages	1	0	4	.37	.00	.72	.54	1.33
Philosophy and Religion	0	0	5	.00	.00	.90	.54	1.42
Communications	0	0	2	.00	.00	.36	.22	.69
Computer/Information Sciences	0	0	2	.00	.00	.36	.22	.75
Agribusiness/Agri Production	0	0	0	.00	.00	.00	.00	.00
Architecture/Environ Design	0	0	0	.00	.00	.00	.00	.27
Business and Office	0	0	0	.00	.00	.00	.00	.00
Engineering/Related Technologies	0	0	0	.00	.00	.00	.00	.00
Home Economics	0	0	0	.00	.00	.00	.00	.84
Voc Home Economics	0	0	0	.00	.00	.00	.00	.00
Industrial Arts	0	0	0	.00	.00	.00	.00	.00
Library Science	0	0	0	.00	.00	.00	.00	.26
Parks and Recreation	0	0	0	.00	.00	.00	.00	.11
Protective Services	0	0	0	.00	.00	.00	.00	.10
Total (2-yr of Doctoral Degrees)	270	103	556	100.00	100.00	100.00	100.15	

National FY 85; some categories combined

Source: US Department of Education, Arizona Board of Regents

ENDNOTES

1. See the working paper on "Enrollment at Arizona Universities: Forecasts to the Year 2000" for a detailed discussion of likely future enrollment trends.

2. This S shaped curve actually becomes a series of curves, each beginning new as a previous level becomes mature. It can be thought of as a "staircase" where there is change, then stability, followed by change.

3. Some of the data presented here gives the appearance of wide swings from year to year. There was no attempt to identify reasons for these variations, but they reflect in part the variation in some definitions or reporting procedures of the individual universities. All enrollment data was derived from the Board of Regents audited figures, not the original university submissions.

4. HEGIS is the Higher Education General Information System.

5. For a complete review of state budget trends, see the Working Paper on "The Arizona Universities: A 25 Year State Funding , Productivity, and Performance Outputs History."

6. For a detailed discussion of this area see the Task Force Working Paper "Nine Year History of Program Changes".

ARIZONA'S SYSTEM OF HIGHER EDUCATION IN COMPARISON TO THOSE OF OTHER STATES

GEORGE H. DAVIS

ABSTRACT

To place Arizona's higher education efforts in perspective, it is instructive to compare the number of universities and colleges in Arizona with the number of universities and colleges in each of the other states; and to compare the number of degrees awarded by universities and colleges in Arizona with the number of degrees awarded by universities and colleges in each of the other states. To draw meaningful comparisons, it is essential to adjust for state tax base and state population. The observations presented are based on 1985 data.

Taking population into consideration, Arizona is among seven states that have the fewest private schools per unit population. The establishment of a relatively large number of 2-year public institutions (community colleges) in Arizona may in part reflect a need to fill a void satisfied in many other states by 2-year and 4-year private colleges. Compared with Arizona, only three states have lower ratios of private institutions to 2-year public institutions.

Arizona is among eight states that have three or fewer "4-year and above"[1] public institutions. Only one state has a fewer number of 4-year and above public universities per capita than Arizona. Arizona has the fewest number of such universities per unit of state tax collections.

Data describing the number of bachelor's degrees generated in 4-year and above public universities in each of the states show that Arizona lies exactly at the median (10,500 degrees in 1985). Measured in terms of number of bachelor's degrees per university, Arizona is the most productive of any state in the nation. The same is true of production of graduate and professional degrees.

Thus, when first-order characteristics of higher education are viewed nationally, Arizona is seen to have a number of striking features:

(1) Arizona has established a disproportionately small number of private colleges and universities.

(2) When adjustments are made for population and state tax collections, Arizona is seen to have the fewest number of 4-year and above public universities.

George H. Davis joined the faculty of the University of Arizona's Department of Geosciences in 1970, following PhD studies at the University of Michigan. His research and teaching have centered on the nature and origin of structures in mountain belts. Davis' undergraduate textbook, Structural Geology of Rocks in Regions, has extended his reach as a teacher to students outside of Arizona, in other parts of the country and the world. He also served as Head of the Department of Geosciences and serves as Vice Provost for Academic Affairs at UA.

(3) Of all the states, Arizona produces the most of baccalaureate, graduate, and professional degrees per university.

Arizona is neither advantaged nor disadvantaged in regard to population and state tax collections. Arizona is at the median in both resource categories. However, by minimizing the number of 4-year and above public universities, Arizona appears to have established a very favorable competitive position in the marketplace of higher education. Of all the states, Arizona has established the least overextended, most productive infrastructure of public universities. Arizona is by no means overextended, and this permits the opportunity for the state to concentrate its resource in ways that will enhance the value of higher education it provides.

RECOMMENDATIONS

(1) Continue to concentrate the available limited resources in the three existing universities (UofA, ASU, NAU), their branch campuses, and educational centers.

(2) Recognizing that available budget resources will not permit the building of excellence in all academic programs, insist that the universities more effectively concentrate resources in select programs which, by virtue of inherent strategic advantages, can rise to prominence in ways consistent with university mission.

(3) Be constantly vigilant for ways to eliminate unnecessary, unwarranted duplication of academic programs or subprograms within or among the three Arizona universities.

In short, quality and value of higher educational opportunities are apt to improve in direct relation to the extent that resources can be judiciously but forcefully allocated within the system and within each university. We should not fail to take fullest advantage of the inherent first-order competitive edge that Arizona derives from its economy of scales.

INTRODUCTION

To place Arizona's higher education efforts in perspective, it is instructive to compare the number of universities and colleges in Arizona with the number of universities and colleges in each of the other states. Similarly, to evaluate one aspect of Arizona's productivity in higher education, it is instructive to compare the number of degrees awarded by universities and colleges in Arizona with the number of degrees awarded by universities and colleges in each of the other states. In order to draw meaningful comparisons, it is essential to normalize the data with respect to state tax base and state population.

ALLEGORY

Visualize the higher education efforts in the State of Arizona as a constellation composed of the three 4-year and above public institutions, the sixteen 2-year public institutions, the seven 4-year private institutions, and the one 2-year private institution (see Table 1 for the names of these schools).

TABLE 1

PUBLIC 4 YEAR

Arizona State University
Northern Arizona University
University of Arizona

PUBLIC 2 YEAR

Arizona Western College
Central Arizona College
Cochise College
Eastern Arizona College
Gateway Community College
Glendale Community College
Mesa Community College
Mohave Community College
Navajo Community College
Northland Pioneer College
Phoenix College
Pima Community College
Rios Salado Community College
Scottsdale Community College
South Mountain Community College
Yavapai College

PRIVATE 4 YEAR

Graduate

American Graduate School of Management
Western International University

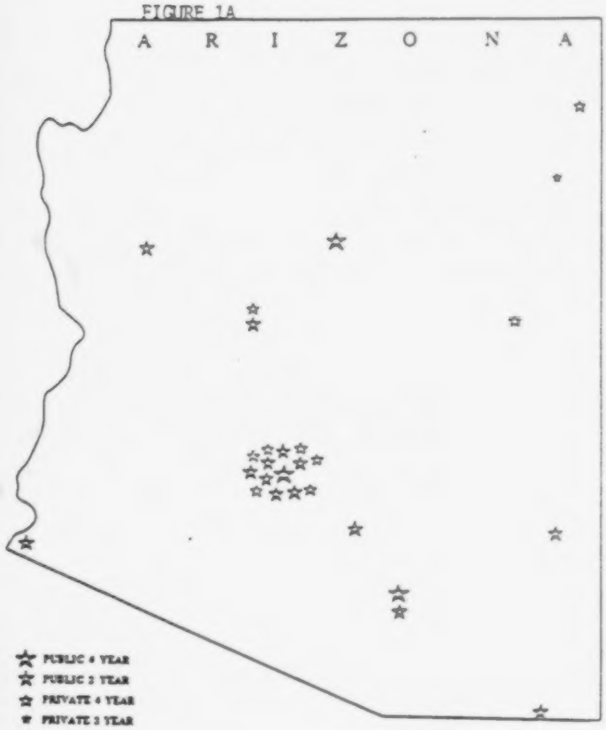
Baccalaureate

American Indian Bible College
Arizona College of the Bible
Grand Canyon College
Prescott College
Southwestern Conservative Baptist Bible College

PRIVATE 2 YEAR

College of Ganado

FIGURE 1A



If the locations of these institutions were plotted with bigger stars and smaller stars according to size, a constellation would emerge that would begin to describe, at least superficially, some first-order characteristics of higher education in Arizona (Figure 1A).

Perspective is added by placing the constellation in a backdrop that displays the population of Arizona and Arizona's annual state tax collections. Some of the energy emitted from the whole constellation (not just single stars) can be measured by totalling the number of graduates that issue from all of the institutions in a single year. (The lifetime effect of the energy represented by each of the graduates will not be known for some time).

"Constellations of higher education" can be prepared in similar manner for each of the other states. The images that emerge invite questions, such as: How

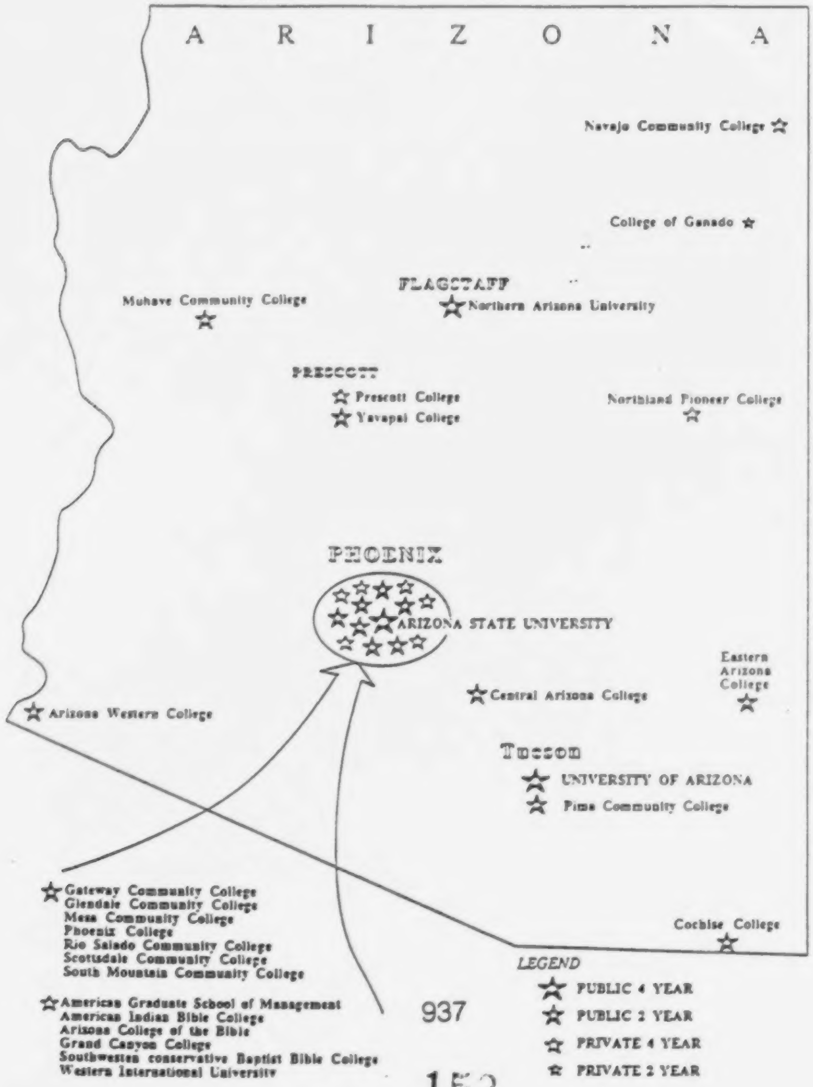
> does Arizona's constellation of higher education compare with those of other states? How much energy is being generated, not only in absolute terms, but also proportionately, taking into consideration population and tax revenue?

> Comparisons invited by such questions may give us a clearer picture of the first-order characteristics of higher education in Arizona, including numbers of universities and colleges, ratios of public to private universities, and degree production of universities, state by state. We may learn that the number and type of Arizona universities are typical of many other states. Or perhaps we may learn that we are unique. We may learn that we generate an average

> number of degrees per university per year. Or perhaps we may learn that we are unusually productive. We may decide that the planning and decisions made over the years by the legislature, the board, and the university presidents have brought us to a favorable competitive position of efficiency and productivity compared with other states. Or we may decide that this is not the case.

The Arizona constellation is then the object of focus of this paper (Figure 1B).

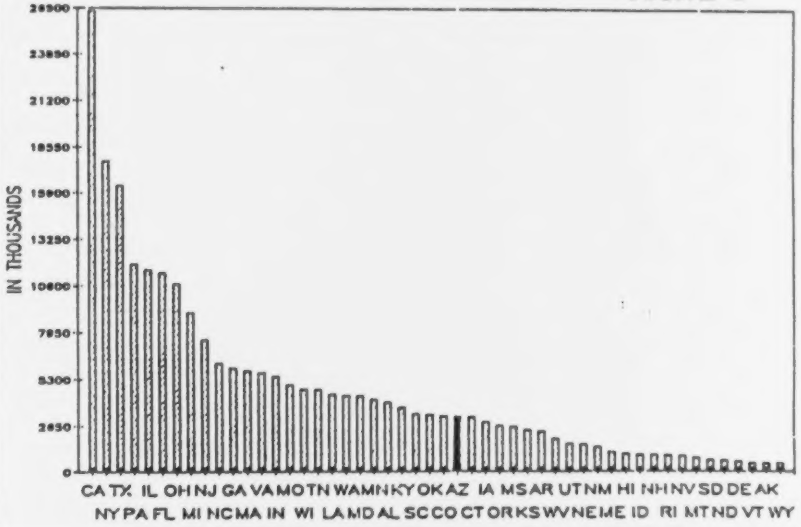
FIGURE 1B


ARIZONA
Navajo Community College
College of Ganado
FLAGSTAFF
Northern Arizona University
Mohave Community College
PRESCOTT
Prescott College
Yavapai College
Northland Pioneer College
PHOENIX
ARIZONA STATE UNIVERSITY
Eastern Arizona College
Central Arizona College
Arizona Western College
Tucson
UNIVERSITY OF ARIZONA
Pima Community College
Cochise College
Gateway Community College
Glendale Community College
Mesa Community College
Phoenix College
Rio Salado Community College
Scottsdale Community College
South Mountain Community College
American Graduate School of Management
American Indian Bible College
Arizona College of the Bible
Grand Canyon College
Southwesten conservative Baptist Bible College
Western International University
LEGEND
PUBLIC 4 YEAR
PUBLIC 2 YEAR
PRIVATE 4 YEAR
PRIVATE 2 YEAR

POPULATION AND TAXES

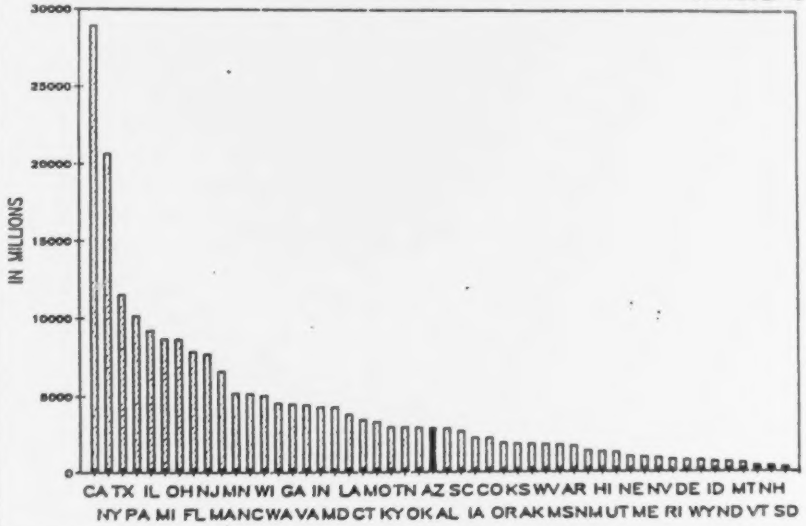
Arizona lies near the median both in state population (Figure 2) and state tax collections (Figure 3). (See Appendix A for the key to the graphs.)

Twenty-six states have greater populations than Arizona; twenty-three have lesser. Twenty-four states have larger tax collections than Arizona; twenty-five have smaller.



STATE POPULATION
1985

FIGURE 2



STATE TAX COLLECTIONS
1985

FIGURE 3

State tax collections normalized according to the population of Arizona reveal that there really is not much difference in state tax collections per capita, except for Alaska (Figure 4). Arizona is near the average.

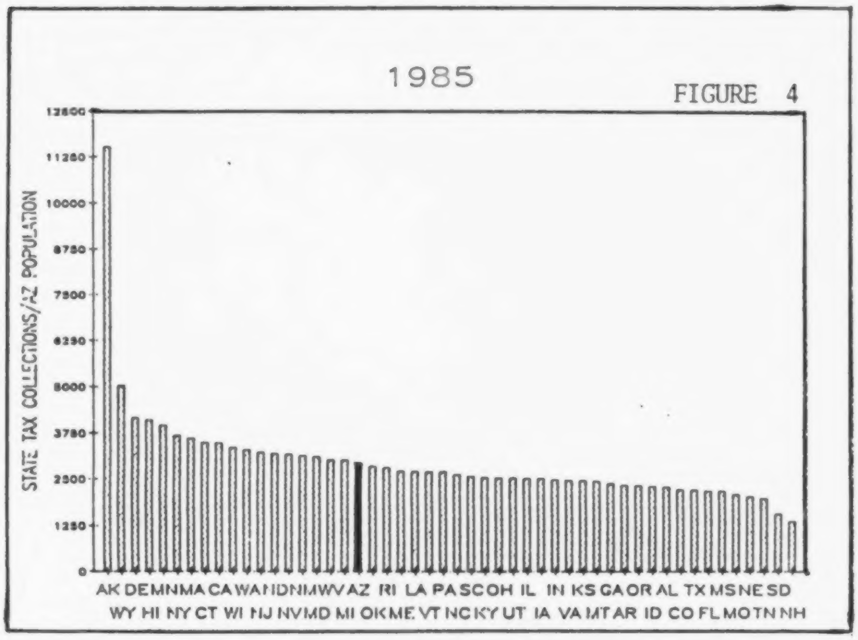


FIGURE 4

Based on population and tax data alone, we might speculate that the number of colleges and universities in Arizona, and the degree production for Arizona colleges and universities, will be found to be average. Based on population and tax data alone, we might conclude that the State of Arizona is neither advantaged nor disadvantaged, compared to other states, in its efforts to establish a quality, comprehensive system of higher education.

THE DATA

The comparative data to be presented are drawn from "State Higher Education Profiles, 1985". Assembled by the Center for Education Statistics, the data were collected through the Center's Higher Education General Information Survey (HEGIS). The sample year is the 1985 fiscal year, from July 1, 1984-June 30, 1985.

PRIVATE SCHOOLS

Compared to most other states, Arizona has very few private colleges and universities. Only one 2-year private school existed in Arizona (in 1985). There are five 4-year private colleges and two 2-year private professional colleges, yielding a total of seven 4-year and above private institutions. Viewed nationally, Arizona ranks 38th in number of 4-year and above private institutions (Figure 5). Taking population into consideration, Arizona is seen to be among seven states that have the fewest private schools per unit population. Figure 6, constructed in such a way to adjust for population differences, shows how many 4-year and above private institutions would exist in each state if the state under consideration had the population of Arizona, and if the state maintained its 1985 ratio of private institutions to population. If Vermont had Arizona's population, and had built private universities according to the 1985 Vermont ratio of private universities to state population, it would have eighty-four 4-year and above private institutions. If Minnesota had the population of Arizona, and the chief assumptions continued to hold, it would a fewer number of private institutions per capita than Arizona.

We might conclude that Arizona has been the most conservative of all states in its propensity to establish private institutions of higher learning.

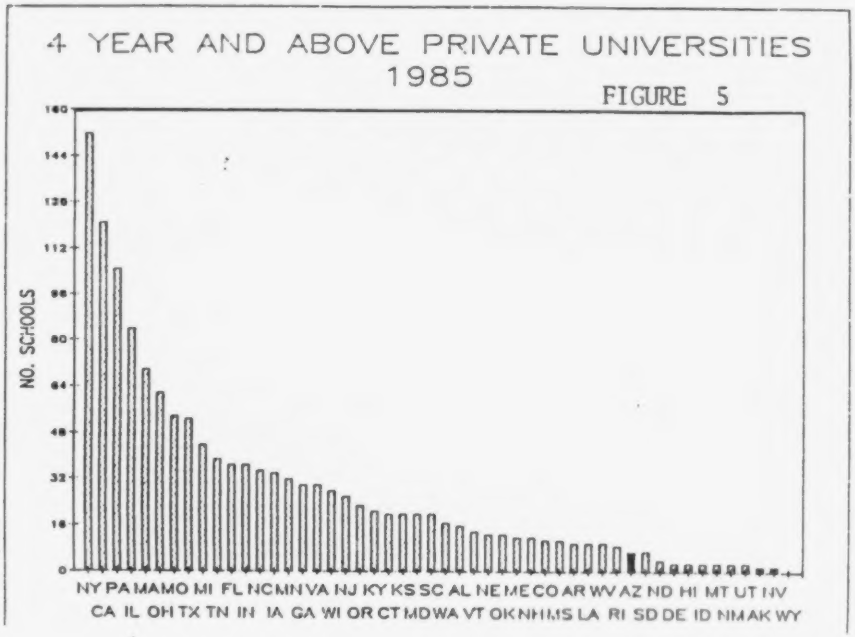

4 YEAR AND ABOVE PRIVATE UNIVERSITIES 1985

FIGURE 5

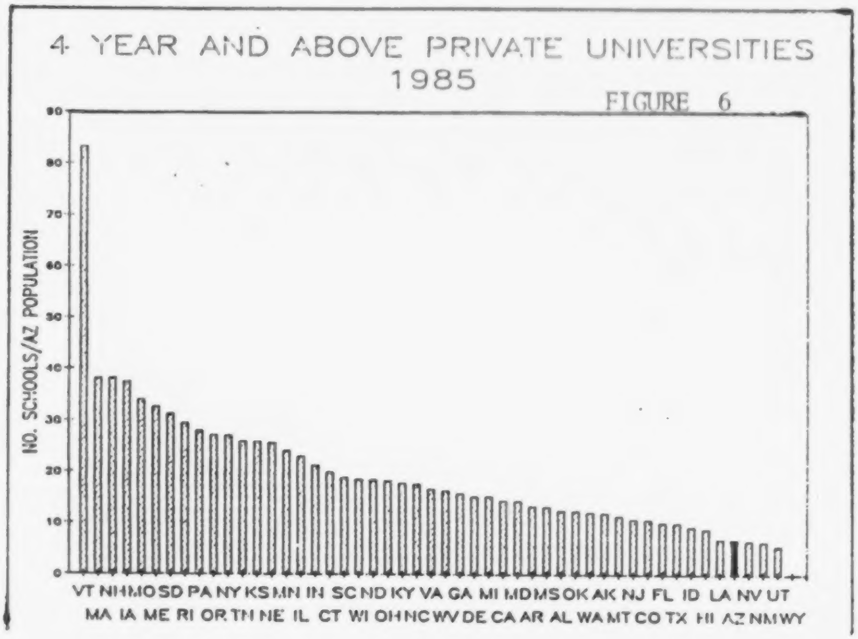

4 YEAR AND ABOVE PRIVATE UNIVERSITIES 1985

FIGURE 6

The dominant factors, quite simply, are geographic and historical. For example, in the 19th century, when private institutions of higher education were being established in great numbers in the United States, the remote frontier territory of Arizona had not yet become a state. We might speculate that the disproportionately small number of private institutions in Arizona may have created, in the 20th century, an unusually strong pressure to establish public alternatives to higher education.

TWO-YEAR PUBLIC INSTITUTIONS

Arizona lies near the median in number of 2-year public institutions (Figure 7).

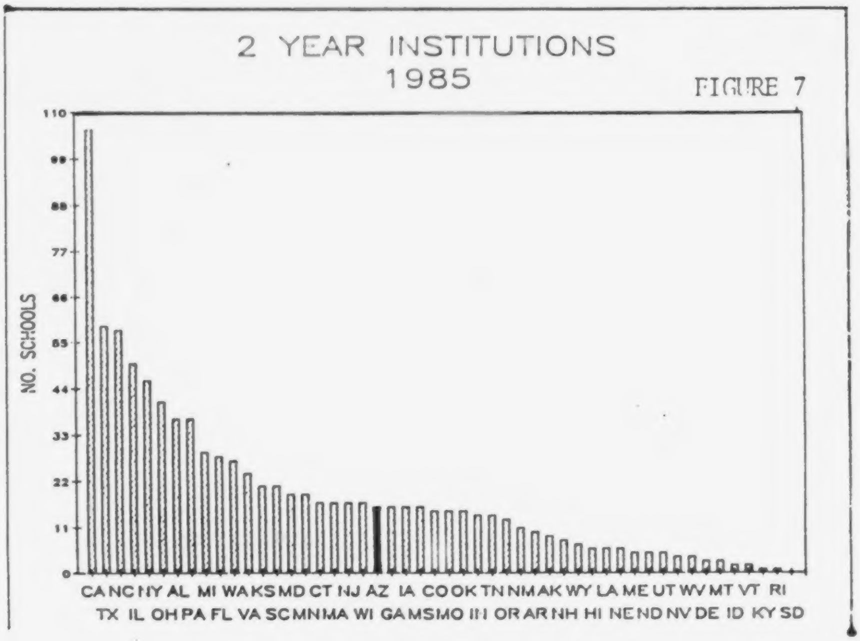


FIGURE 7

Twenty states have a greater number of 2-year public institutions; twenty nine states have fewer. When the number of 2-year public institutions is normalized according to population (Figure 8, it becomes evident that Arizona ranks 15th in the number of 2-year public institutions per capita; ...15th in its propensity to establish 2-year public institutions.

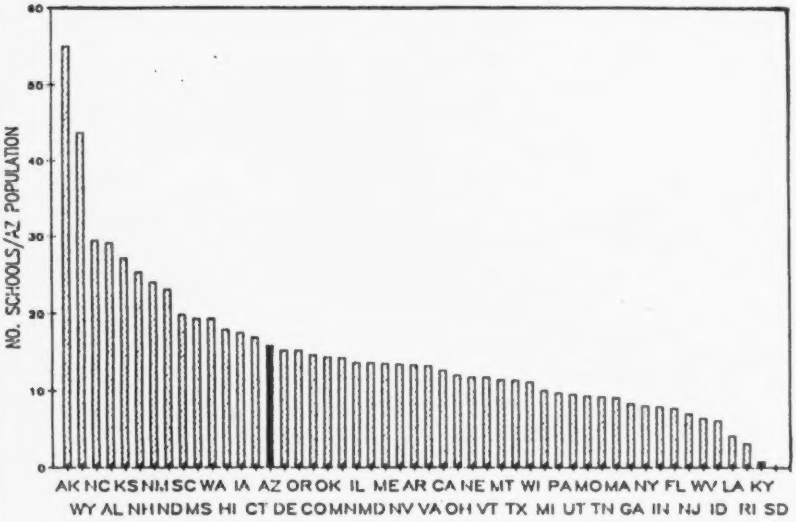
We conclude that the establishment of a relatively large number of 2-year public institutions (community colleges in Arizona may partly reflect a need to fill a void satisfied in many other states by 2-year and 4-year private colleges. Only Wyoming, Alaska, and New Mexico have lower ratios of private institutions to 2-year public institutions.

Figure 9 shows the number of associate degrees generated in 2-year public institutions in each of the states. Arizona's ranking in total number of associates degrees, just above the median, is exactly the same as its ranking in number of 2-year public institutions. Twenty states generated a larger number of associate degrees in 1985; twenty-nine states generated fewer. The states of California, New York, Florida, Texas, Michigan, Illinois, and Ohio are in a class by themselves in numbers of associate degrees generated per year. California, the leader in this category, graduated nearly 50,000 students with associate degrees in 1985, compared with Arizona's 5,000 (Figure 9).

To examine degree production at 2-year public institutions, we look at the number of associate degrees per university per year (Figure 10). Arizona's production

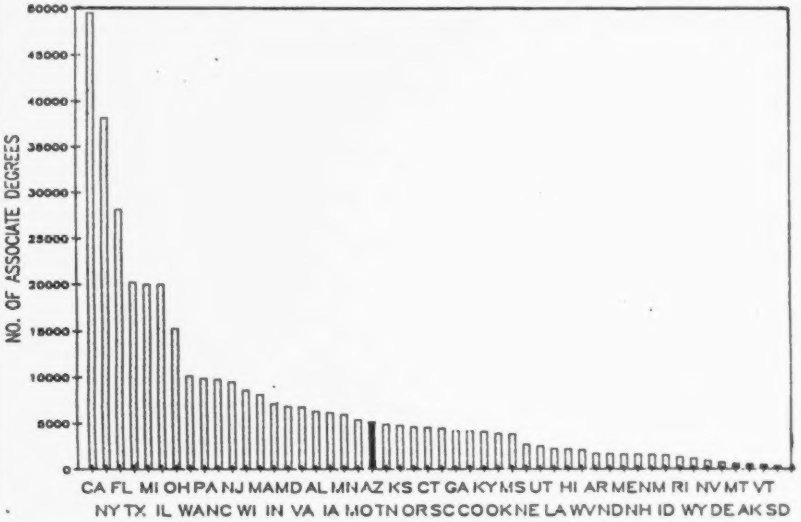
TWO YEAR PUBLIC INSTITUTIONS
1985

FIGURE 8



2 YEAR PUBLIC INSTITUTIONS
1985

FIGURE 9



rate of 320 ranks slightly below the median. Twenty-seven states produce a higher number of associate degrees per university per year; twenty-two states produce a fewer number. Kentucky is in a class by itself, producing in excess of 4000 associate degrees per university per year (Figure 10).

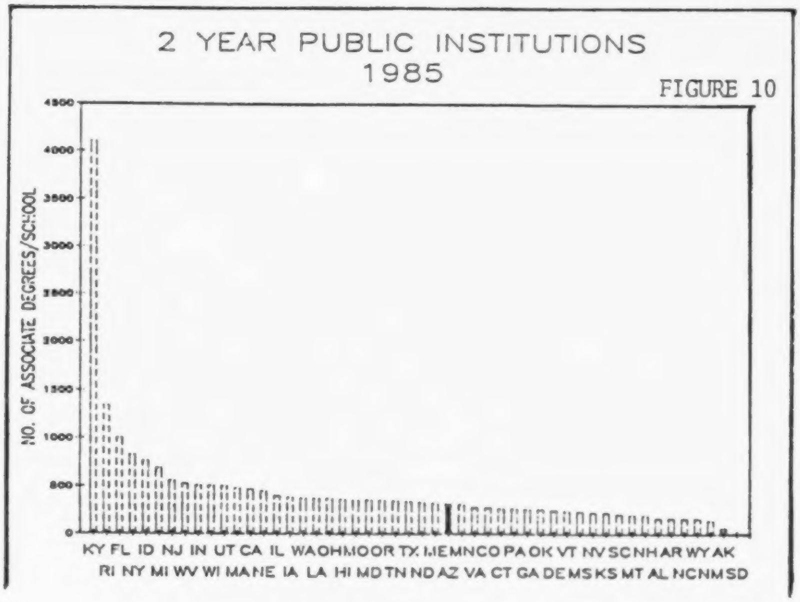


FIGURE 10

Whereas the number of two-year public universities in Arizona is above average when state taxes and state populations are taken into consideration, the production rate of associate degrees is a little below average. This fact, combined with knowledge of the scant number of private institutions in Arizona, may lead us to conclude that the three 4-year and above public institutions in Arizona must play an unusually dominant role in higher education in the state.

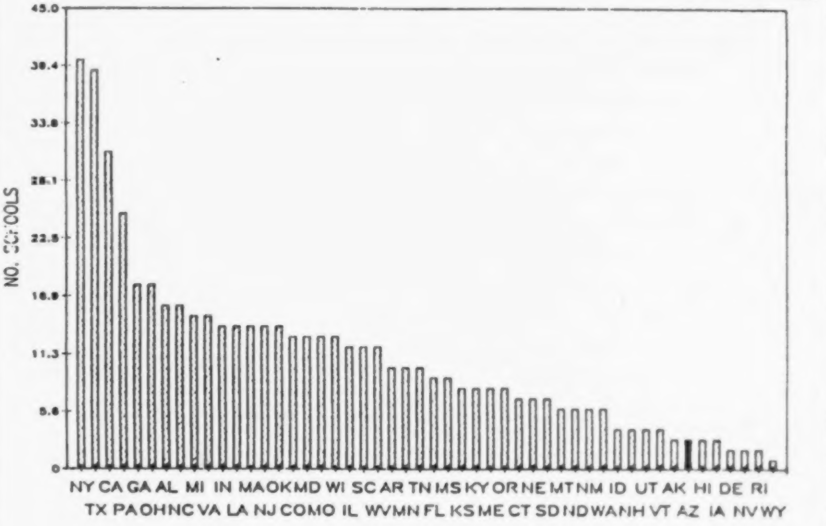
FOUR-YEAR AND ABOVE PUBLIC INSTITUTIONS

Figure 11 shows the number of major public universities (4-year and above) in each of the fifty states. New York has the most with forty. Two- thirds of the states have between ten and fifteen 4-year and above public institutions. Arizona is among a group of eight states that in 1985 had three or fewer 4-year and above public universities. Alaska, Hawaii, Iowa, Delaware, Nevada, Rhode Island, and Wyoming form this group, along with Arizona.

The uniqueness of Arizona's higher education thrust is revealed in the number of public universities per unit of population in each of the fifty states (Figure 12). As described earlier, the unit of population that we choose to use is a special one: 3.2 million, the population of Arizona in 1985. Figure 12 thus reveals how many 4-year and above public universities would exist in each state if the state had the population of Arizona, and if the state maintained its present ratio of universities to population. If, for example, South Dakota had Arizona's population, and had built universities according to the 1985 ratio of universities to population in South Dakota, it would have thirty-two 4-year and above universities. If New York had the population of Arizona, and the chief assumptions continued to hold, it would have eight 4-year and above public universities. Only Florida would have a fewer number of public univer-

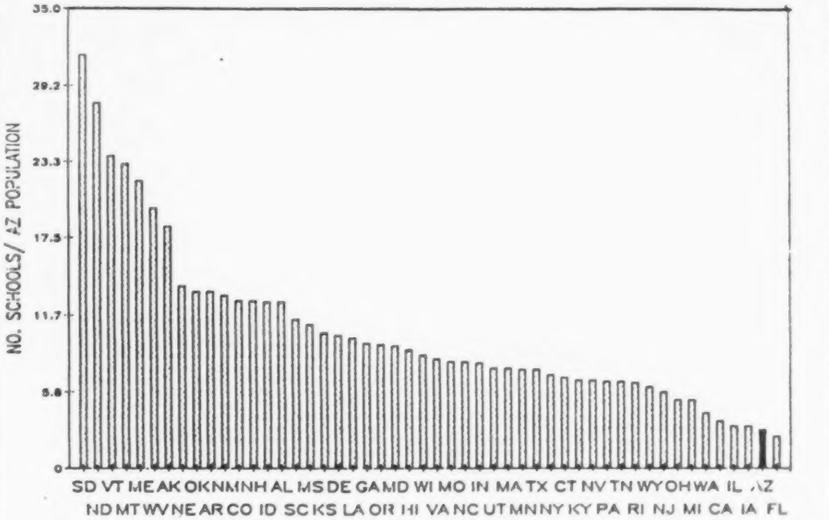
4 YEAR AND ABOVE PUBLIC UNIVERSITIES
1985

FIGURE 11



4 YEAR AND ABOVE PUBLIC UNIVERSITIES
1985

FIGURE 12



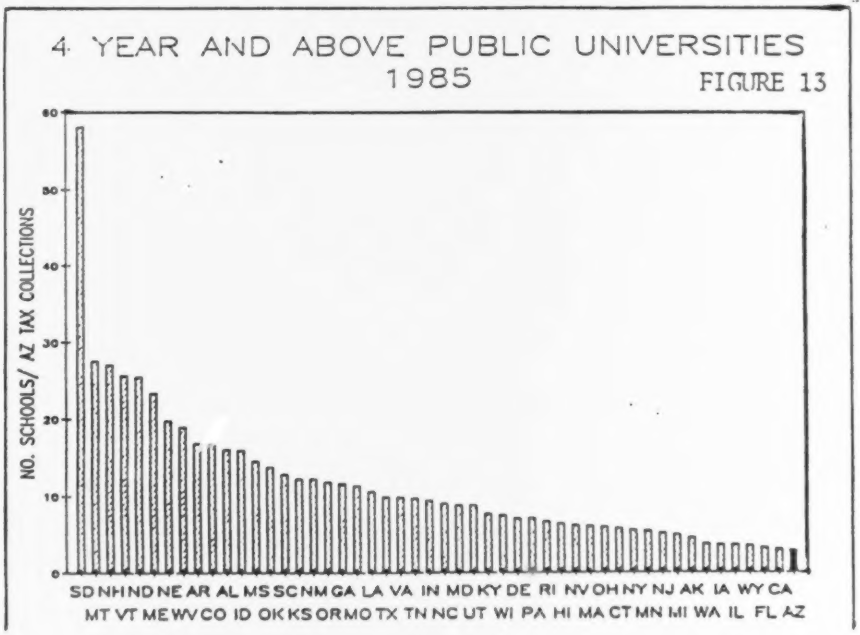
sities per capita than Arizona.

We might conclude that with the exception of Florida, we are the most conservative of all states in our propensity to establish 4-year and above public universities. We might conclude that, with the exception of Florida, we are the least overextended of all the states. Arizona would appear to have a significant competitive advantage over other states: greater value is achieved in distributing limited resources among an unusually small number of public universities, providing of course that the fundamental requirements of quality of education and access to higher education are being met.

Normalizing the data according to state tax collections yields similar results. Figure 13 shows the number of public universities per unit of tax collections in each of the fifty states.

The unit of state tax collections is again a special one: $2,945,000,000, the state tax collections for Arizona in 1985. The figure reveals how many 4-year and above public universities would exist in each state if the state received the same level of tax revenues received by Arizona, and had built universities according to the 1985 ratio of universities to tax collections. If South Dakota enjoyed Arizona's tax revenue, and had invested in universities in the manner it has to date, it would have fifty-eight 4-year and above public universities. Texas would have ten. Arizona would have the fewest number of universities per unit of tax collections.

Again we are led to conclude that of all the states, Arizona is the most conservative in its propensity to establish 4-year and above public universities. We might conclude that we are least over extended of all of the states with respect



4 YEAR AND ABOVE PUBLIC UNIVERSITIES 1985

FIGURE 13

to establishing 4-year and above public institutions. We might conclude that as we plan our future we enjoy a competitive advantage over all other states.

Figure 14 shows the number of bachelor's degrees generated in 4-year and above public universities in each of the states. Arizona lies exactly at the median, with 24 generating a greater number and 25 generating a lesser number. In 1985, the Arizona universities collectively awarded approximately 10,500 bachelor's degrees.

When we look at production of bachelor's degrees as measured in degrees per university per year (Figure 15), we find that the state of Arizona has the highest productivity of any state in the nation. Arizona generates approximately 3500 bachelor's degrees per university per year. Most states produce between 500 and 1500 bachelor's degrees per university per year. We conclude that of all the states we are the most productive in our yield of baccalaureate graduates.

Data describing the production of graduate and professional degrees from state to state reveal an identical picture. Arizona lies exactly at the median in number of degrees awarded, with 25 states generating a greater number and 24 generating a lesser number (Figure 16). In 1985 the Arizona universities collectively awarded 4,000 graduate and professional degrees.

Viewing production data (Figure 17) we find that no other state exceeds Arizona in the number of graduate and professional degrees awarded per university per year. Approximately 1250 graduate and professional degrees per university were awarded in Arizona in 1985. Most states produce 300 to 600 graduate and professional degrees per university per year. We might decide that the universities in Arizona, and their faculties, are the highest producers of graduate and professional degree recipients than any state in the nation.

ANALYSIS AND CONCLUSIONS

When we look at first-order characteristics of higher education in Arizona, compared to those of other states, we discover that Arizona is extraordinarily unique. Full awareness of our singularity is absolutely essential in future planning.

Part of Arizona's uniqueness is a disproportionately small thrust in private education at the college and university levels. We might speculate that this fact may historically have led to compensation (or overcompensation) in the public sector of higher education. To some extent this is the case, for our system of 2-year public universities (community colleges), when viewed in the context of population and tax base, is more generous in size than that of approximately two-thirds of the other states. Yet when data are examined that describe the number of associate degrees that are generated by Arizona's 2-year public universities compared to other states, we find that the productivity is average or a little below average.

Compensation for the lack of in-state private alternatives to higher education in Arizona is seen primarily at the level of 4-year and above public universities. Compensation is not expressed in the number of universities, for when the data are normalized Arizona is seen to have the fewest 4-year and above public universities of any state in the nation.

Instead, compensation is expressed in productivity: No state is more productive than Arizona in producing baccalaureate, graduate, and professional degrees. The yield per university per year is significantly higher than that for any other state in the nation.

By minimizing duplication through building a bare minimum number of 4-year and above public universities, Arizona appears to have established a very favorable competitive position in the marketplace of higher education. We are by no means overextended as an educational enterprize. In fact, we appear to be have established the most conservative infrastructure of higher education than any other state. Arizona ought to be able to plan its future thoughtfully and prudently, unlike other states whose first order business might be to find ways to cut back to a less extended, more conservative posture, the prototype example of which is Arizona. Our non-overextended position permits the opportunity for the state to concentrate its resources in ways that will enhance the value of higher education in Arizona.

Even though certain first-order competitive advantages exist, we are not a rich state. We do not, unfortunately, enjoy a comparative resource advantage. Neither are we disadvantaged. Our median ranking both in population and state tax revenues reminds us of our "average" resource potential.

We might suggest that just as the state has, to date, concentrated its resources in only three public universities, so each university must decide on the number and nature of academic areas in which its resources should be most heavily concentrated. The available budget resources simply will not permit the universities to build excellence in all academic programs. Instead, universities must continue to identify priority areas based in part on inherent strategic advantages born out of history, geography, and existing faculty strength; and in part on a careful assessment of which academic activities will most benefit economic development and quality of life in the state, nation, and world. Quality and value of higher educational opportunities are apt to improve in direct relation to the extent that unnecessary, unwarranted duplication of academic thrusts within the three Arizona universities can be avoided.

RECOMMENDATIONS

- Resist pressures to establish additional 4-year and above comprehensive public universities and, instead, concentrate the available limited resources in the three existing Arizona universities. If this is done while other states seek to find ways to cut back to less extended, more conservative postures, Arizona will capitalize on its competitive advantage.

- Recognizing that available budget resources will not permit the building of excellence in all academic programs, insist that the universities more effectively concentrate resources in select programs which, by virtue of inherent strategic advantages, can rise to prominence in ways consistent with university mission.

- Be constantly vigilant for ways to eliminate unnecessary, unwarranted duplication of academic programs or subprograms within or among the three Arizona universities.

In short, quality and value of higher educational opportunities are apt to improve in direct relation to the extent that resources can be judiciously but forcefully allocated within the system and within each university. We should not fail to take fullest advantage of the inherent first-order competitive edge that Arizona derives from its economy of scales.

APPENDIX A

KEY FOR GRAPHS

AL = Alabama
AK = Alaska
AZ = Arizona
AR = Arkansas
CA = California
CO = Colorado
CT = Connecticut
DE = Delaware
FL = Florida
GA = Georgia
HI = Hawaii
ID = Idaho
IL = Illinois
IN = Indiana
IA = Iowa
KS = Kansas
KY = Kentucky
LA = Louisiana
ME = Maine
MD = Maryland
MA = Massachusetts
MI = Michigan
MN = Minnesota
MS = Mississippi
MO = Missouri

MT = Montana
NE = Nebraska
NV = Nevada
NH = New Hampshire
NJ = New Jersey
NM = New Mexico
NY = New York
NC = North Carolina
ND = North Dakota
OH = Ohio
OK = Oklahoma
OR = Oregon
PA = Pennsylvania
RI = Rhode Island
SC = South Carolina
SD = South Dakota
TN = Tennessee
TX = Texas
UT = Utah
VT = Vermont
VA = Virginia
WA = Washington
WV = West Virginia
WI = Wisconsin
WY = Wyoming

ENDNOTES

1. "4-year and above" institutions include colleges and universities that award baccalaureate degrees only, and universities that award graduate and professional degrees in addition to baccalaureate degrees.

FUTURE CHANGES: IMPLICATIONS FOR ARIZONA'S UNIVERSITIES

ROGER L. CALDWELL

PREFACE

This working paper contains two separately bound sections. Part I is the summary, conclusions, and recommendations of future changes and their relationship to the Arizona universities. Part II provides background materials for developing those conclusions and is included as supporting documentation.

The primary results of an environmental scan are summarized in Part II of this working paper; additional details may be found in the working paper "Arizona Environmental Scan Study."

There are several Task Force working papers that provide related information:

1. Opportunities for Telecommunication for University Outreach in Arizona.
2. Executive Summaries of Reports and Books on Higher Education.
3. Arizona Environmental Scan Study.
4. Some Thoughts About Approaching the Future of Arizona.
5. Foresight: Definition and Need for Arizona Universities.
6. Strategic Planning and the Arizona Universities.
7. Enrollment at Arizona Universities: Forecasts to 2000.
8. University Research and Economic Development in Arizona Today: A Working Paper.
9. Arizona Universities in Transition.

I would like to thank numerous reviewers of early drafts of this report, both within and outside the university system.

PART I.

SUMMARY AND RECOMMENDATIONS

PURPOSE

The purpose of this Working Paper is to identify a range of possible futures in Arizona during the next 20 or so years of most relevance to the universities. This should be done in such a way that the Arizona universities will have a framework within which to identify relevant events and desired actions. This framework would then allow university development of plans for some anticipation of the future needs and events in

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Roger L. Caldwell has been a member of the University of Arizona for 20 years, where he is a Professor of Soil and Water Science. He has served in several administrative positions relating to general environment, energy conservation, computing and information services, and academic planning. He has taught in the fields of plant diseases and pesticides, environment, alternative futures, and scientific communication methods. He has served on several state and local governmental committees relating to economic development, transportation and environmental concerns.

Arizona. While it is not possible to predict the future over long periods, informed decisions made today, based on observation and understanding of the forces of change, can cause particular future outcomes.

The design of this paper contains three main parts:

1) identifying six broad areas of driving forces of change and listing selected trends to represent the range of possible events likely from these driving forces,

2) presenting four scenarios that group the trends in different combinations (and some unlikely but possible options), and

3) summarizing the implications for the Arizona universities identified by studying these scenarios.

It is not the purpose of this paper to forecast near term (one to two years) changes, but to identify a range of possible and plausible futures for purposes of developing a strategic plan (5-10 year range). This is done largely by summarizing existing studies and adding a small amount of new material.

OVERVIEW

There are few times in history when major shifts in society occur to such an extent that the shift can be labeled as the beginning of a new era. Examples include the agricultural and industrial revolutions and, more recently, the information or knowledge revolution and the emerging biological revolution. When one is a participant in such a dramatic change, it is difficult to comprehend the scope and implications. Those with vision are better able to grasp the overall essence of the new conditions. With a few guiding principles, these visionaries can navigate the currents of changing times with an advantage relative to others who are reacting to old events or are dependent on simple extrapolations of past trends. We seem to be in a period of such fundamental change and need to pay particular attention to early warning signals of change that are not readily evident.

If one develops a "mindset" that recognizes the central themes of these changes, then many other details follow much more easily, as there is a frame of reference for everyday observation and decision making. Examples of some of these central themes include shifts in population patterns, underpinnings of the economy, and anticipated technological changes.

Further, the need for continuing analysis and evaluation of options, living with uncertainty, and managing change will be critical to a better understanding of how to make decisions today. The challenge is to identify and understand sufficiently the forces of change to recognize critical areas of concern, and not be misled by following historic trends that may no longer be relevant or even real.

Universities are in the knowledge business. This includes the presentation and analysis of existing knowledge, the acquisition of new knowledge through research, and the transfer or packaging of knowledge to students and off-campus clientele. This fundamental activity of the university is worthy of an analogy, as the methods for performing these activities vary with time and sometimes get confused with the basic product. The analogy relates to the old time railroad industry. Believing it was in the railroad business rather than the transportation business, the railroad industry fell prey to successful competitive alternatives developed by others. The same competitive situation exists today for universities, as new and existing firms and organizations become more involved in information technology.

Some examples might include the impressive growth of private institutions such as the University of Phoenix and the existence of Texas-originated satellite-delivered programs to Arizona primary schools.

The implications of possible changes to universities are significant but require further research and debate to better understand which actions to take.

There are many changes to consider, including the impacts of new technologies, results of changes on societal values, possibility of information overload, cooperative efforts among groups or individuals for integrated problem solving techniques, and the development of new job categories.

These all require significant university based actions. Finally, whatever the university response, it will not come easily. The infrastructure must be capable of responding to change even when the best direction may not be clear, or the forces of change might be directed from outside the university.

APPROACH

The approach to studying future trends and issues for this report differs from that of typical studies. This approach presumes that it is better to have a range of options for study and understanding, rather than a detailed listing of specific predictions or forecasts, even though some details are necessary to identify a broad understanding of current or emerging trends. One of the difficulties of assessing future choices in a time of fundamental change is that conflict may surface between those following the "old" understandings and those believing they see "new" trends. It is often difficult to identify relevant data or to expose trends that may go counter to the expectations of those in highly visible positions. Accordingly, the report focuses on probable major changes and their impacts on the universities rather than extrapolating a number of existing trends in detail.

This working paper briefly summarizes important national and state studies on the subject, related studies completed recently by the Regents or universities, and abstracted results of Task Force staff interviews. The paper outlines emerging trends and possible discontinuities. From these, a listing of principal driving forces are identified, with selected possible trends listed. A series of possible scenarios and their impacts on universities is presented. Finally, a list of conclusions and recommendations believed significant for action by the Arizona universities is identified.

LIMITATIONS

There are certain limitations to any study of the future. Studies are influenced by the study purpose, stated or unstated assumptions and definitions, background of the authors, requesting organization, and specific approach. There is no single "right" way to perform these studies, but there are potential traps for those that take conclusions at face value without developing an understanding of the study background.

PRINCIPAL DRIVING FORCES AND EMERGING TRENDS[1]

Numerous existing or emerging trends can be identified from multiple sources, although some provide contradictory information. Focusing multiple trends into a few "driving forces for change" allows a better summarization of the trends for our evaluation of changes that might affect the universities over the next decade or so.

Several specific trends can be selected from the many implied by the driving forces to better understand the implications of some of the expected changes. These are grouped into the same categories that described the driving forces, and are based on the background materials found in Parts II and III of this report. These trends will be used to build the scenarios and implications for the universities in the next sections.

DEMOGRAPHIC TRENDS

Changes in the population age distribution and recent migration patterns suggest the growth rate of Arizona will not be as rapid in the next 20 years as in the past 20; however, it will still be substantial. Shifts in age distribution are moving the dominant age group away from the prime migration years.

- Continued growth of the Arizona population above the national average, but at a slower rate than in the recent past.
- Changing ethnic, sex, and age mix of students and their reasons for attempting higher education.
- Minority representation will continue to increase in the general population and especially in the early school years.

ECONOMIC CHANGES

The economies of the United States and Arizona are increasingly international in scope. The world is getting smaller and countries are becoming more interdependent. The resolution of the national economic condition (debt and trade deficits) will have a long-term impact on the economy, particularly those sectors with significant federal funding. In addition, job creation will be shifting partly to service economies, will be dependent partly on new technologies, and will likely cause multiple training needs throughout a person's career.

Impacts of automation on manufacturing and especially service industries may cause an increase in people that are "unemployable" as non-skill jobs disappear. A substantive impact will be seen from small business and industrial concerns in providing employment.

There may be conflicts between the historic independent and competitive nature and the working together cooperatively that may be necessary in complex projects or international activities. Decreases in the number of young people entering the workforce and the increased number of part-time workers (especially involuntary second jobs) have made several current indicators of change (e.g., unemployment) less meaningful.

- Increases in number and activities of institutions and companies competing for the knowledge industry.
- Automation in the service sector (artificial intelligence and ease-of-use

170

interfaces between machine and human); flexible automation in the manufacturing sector by easily adaptable robotics to new processes within short time periods.

- Increasing mismatch between types of available jobs and types of college training and between jobs demanding college education and low-ability jobs.
- Increasing/decreasing inflation /interest rates depending on economic conditions.
- Large businesses will be much more information intensive with many fewer levels of management.

HEALTH AND ENVIRONMENT ISSUES

Continued concerns in natural resource and environmental issues, and in safety of food, air, and water supplies will likely invite additional government regulation. As urban areas increase and become very large, waste disposal and replacement needs for inadequate services become more evident. Costs of large-scale health problems such as AIDS, new drugs and test procedures, replacement body parts, and extended life spans will have very large but hard-to-anticipate effects on the economy, ethics and the workplace. Activities directed toward drug and other chemical abuse problems are likely to become more pronounced.

- Increased expectations for provision of medical care for workers and families.
- Extended life spans will compete for available medical services.
- Continued neglect of general civic education and "how to function in today's society" education at all levels.
- Dealing with impacts of "megacities" relating to congestion, waste disposal, rebuilding infrastructure of buildings/ roads/services.

POLITICAL SHIFTS

The roles of communities (extended family, neighborhood, work related, politically motivated) are changing. New information technologies allow disparate groups to coordinate efforts with rapid transfers of information. Political parties may produce a broader range of political options (rather than maintaining the two historic major parties). Political changes are occurring at both local and national levels, toward more involvement and interest by a broader group of people.

- Continued single-issue interests and strengths of some specific groups will be maintained.
- Changing influences of minorities, particularly in the Southwest, will affect historic political controls.
- Increased demand for human services provided by the state.
- Increased political influence of minority populations in Arizona (especially Hispanic and American Indian).
- Expectations of high level of services provided by government.
- Increased divisiveness between urban and rural interests (due to differences in economic categories of rural vs two major metropolitan areas).

SOCIAL VALUES

The values and attitudes of the population are changing and are difficult either to fully understand or to summarize. Rather than a single large group, there are several groupings (e.g., belongers, achievers, socially conscious, need-driven) and the relative significance of each changes over time. Early warnings exist for a shift to viewpoints reflective of greater tolerance, greater diversity of interests and greater social activitism.

- Increased needs for minority involvement across the various sectors of society are becoming more evident.
- Greater stress is likely to be placed on workplace benefits and other nonfinancial support for a changing workforce.
- Long-term social and health needs in competition with other needs for state funding.
- Fewer or greater very poor or very wealthy in the United States.
- Consumers will increase their collective strength for product quality and truth in pricing/advertising.
- Increases in a "permanent" underclass resulting from manufacturing and service automation and reductions in the size of the middle class.
- Impacts of alteration of societal support systems resulting from new technology (e.g., 24-hour access to computing systems that are based on decades old accounting and information handling processes; legal procedures in relation to telecommunications technology and "non-physical" evidence).

TECHNOLOGICAL INNOVATIONS

It is appropriate to refer to some changes in technology as revolutionary. These changes will significantly affect how society functions. Examples include information industries (e.g., computing, communications, storage and retrieval, artificial intelligence); biological technologies (e.g., synthetic drugs and hormones, life extension and body-part replacement); and synthetic materials or new ways of using natural materials (e.g., high strength, light, inexpensive materials designed for specific purposes). These changes in some cases will be pervasive throughout society and in other cases will have specialized impacts.

The impacts on society will be both positive and negative, and will elicit increased dialogue among technologists and non-technologists as to the appropriate role of these changes in society.

- Increased regulation of the biological sciences industry.
- Centralization/decentralization of technology in major firms or entrepreneurial firms.
- Increases/decreases in the amount of industrial earnings devoted to research and development.
- Increased rate of implementation of new technologies.

UNCERTAINTIES EXIST

There are uncertainties in interpretation of some easily available data. Three examples are given for illustrative purposes. First, the shift from manufacturing to service industries is clearly evident when reviewing employment data and their extrapolations.

The more obvious reasons for this are

1) manufacturing has increased in efficiency (productivity) through automation, and

2) labor intensive manufacturing has been transferred to other countries.

However, there are two other reasons for the relative increase in service industries: these industries have a greater number of part-time employees which are counted as equivalent to full-time employees in manufacturing, and some manufacturing activities are contracted to service industries (e.g., secretarial, job shops needs, design work). In addition, pay is generally less in service activities and some industries exist as "hollow" shells that only appear on paper as organizations.

These types of shifts between traditional job classifications are complicated by the development of new jobs (e.g., information technology specialist, biotechnology technician). Examples occur of employees becoming "intropreneurs" within their own company where innovation can take place even in traditional organizations; these too are hard to see, as they appear as historic organizations when viewed from the outside.

Another uncertainty is the rate of migration between states and the immigration rate into the US (legal and illegal). The age distribution has moved the U.S. baby boom group into the age where migration has been much lower, likely causing a slower growth rate for states like Arizona in the next 20 years compared to the last 20 years.

While it seems reasonably certain the overall national migration rate will slow, the actual numbers of migrants for specific states are hard to determine.

Other factors suggest further slowing of Arizona's growth rate due to revitalization of the northern or midwestern cities or increased pollution in Arizona cities. On the other hand, this reduction in population growth rate might be off-set by impacts of any further decreases of quality of life in states like California.

Finally, we can make some estimates of what might happen to the labor market. The facts which are easy-to-gather suggest continued low unemployment rates because of continued economic growth with a lessening number of young entering the labor pool. The trends suggest an extended working period as functional life spans increase and attitudes about forced retirement continue to change. The uncertainties arise from several possibilities: transfer of older workers to fill jobs younger workers once filled (e.g., fast food franchises); competition of middle-aged (baby boom bulge) workers for management positions when those positions are decreasing in number; increasing immigration of foreign workers to fill menial jobs; and extended working opportunities for the post-65 population.

The implications are significant but unclear: frustration and career shifts by middle-aged employees, combining flex working time and flex vacation schedules, accommodating new work options for joint employee work with a single job position, increased day care opportunities, benefit needs shifting from financial to non-financial benefits, increased formal retirement ages, and retraining actions for multiple career lifetimes.

CHALLENGING COMMON ASSUMPTIONS

HIGH TECHNOLOGY AND JOB CREATION

Assumption:

High technology industries will be a primary creator of professional jobs.

Response:

In the five year period 1987-1992 there are more Arizona jobs anticipated in health care (over 26,000) and education (over 27,000) than in engineering related occupations of all types (19,000); for physical and biological sciences combined the total is less than 1,300. In addition, most job categories do not require advanced education and these are in some of the most rapidly growing service classifications.

INSTITUTIONAL INERTIA AND CHANGE POTENTIAL

Assumption:

Universities are perceived by some as difficult to change because of the faculty tenure process and autonomy from external controls.

Response:

In the Arizona universities dramatic change has occurred in response to changing conditions; however, most of this change has developed through adding new programs and activities rather than redirecting old ones.

This has been made possible by growth in faculty numbers and a funding process that allows redirection of existing funds and requests for new program funds within the discretion of the universities. On the other hand, the universities could be accused of responding only to selected changes taking place in the state environment. Leadership and commitment (along with appropriate incentives) are more important in changes of this type than historic trends.

MINORITY INVOLVEMENT IN EDUCATIONAL OPPORTUNITIES

Assumption:

Minorities have nondiscriminatory opportunities just like other segments of society.

Response:

While minority- and low-income-student access to higher education meets equal opportunity standards, there are still numerous barriers for these groups to effectively complete college education; there is de facto limited access. Part of this limitation is rural isolation, which disproportionally affects American Indians and Hispanics. Examples include financial limitations, cultural changes, and early educational preparation.

POPULATION GROWTH AND MIGRATION RATES

Assumption:

Arizona's population growth will continue the historic rapid growth, and past trends can be extrapolated for estimates.

Response:

Population growth will slow due to the changing age structure, putting the baby boom bulge past the age of highest migratory potential; northern cities no longer have the same conditions that forced or encouraged people to leave during the last 20 years and have been receiving population increases, and the previously satisfying amenities in Arizona are in question (air and water pollution, traffic congestion, or even sunshine).

SCENARIO DEVELOPMENT

OVERALL ASSUMPTIONS

There are several assumptions that are sufficiently likely that they are included in all scenario examples. These include the internationalization of the economy, the shifting population age structure, and impacts of technology. All of these changes will have dramatic effects in the political, economic, social, and educational systems in Arizona.

SCENARIO A

(Business as Usual)

The economy and political attitudes follow the course of recent years, remaining generally conservative. The economic growth period continues with only minor and infrequent recessions, and the debt and international trade balances trend toward zero by slowing spending rather than increasing taxes. The service sector increases as a percentage of the labor force; limited competition is seen for educational services from non-education institutions. Economic growth in the range of 2.5 percent annually.

SCENARIO B

(Strong Economic Growth)

The economy grows more rapidly than recent past, fueled by increased exports and increases in productivity in both the manufacturing and service sectors. Disposable income increases moderately and major breakthroughs occur in specialized technologies. These changes which allow major increases in productivity the service sector and manufacturing sectors also reduce the need for trade, as products can be made efficiently and flexibly, with rapid changes to meet demand either close to the manufacturing plant or distant. Growth rate of the economy in the range of 3.0 percent annually.

SCENARIO C

(Strong Economic Downturn)

Significant changes occur as a result of prolonged and significant economic downturn, causing serious reductions in federal and state spending; social unrest increases because of an increased size of the lower class and further break up of family structures. An increase in the aging population along with a decrease in numbers of young workers causes more "retirement" age workers to remain in the workforce, but in lower-paying jobs.

Productivity does not grow and new technologies are either not economically developed or are unable to penetrate the economy in any significant amount.

SCENARIO D

(Mild Economic Downturn)

The economy slows with recession by the early 1990s, consumer spending slows, taxes increase, and government spending shifts from defense to societal programs. Cooperative efforts increase between education, government and industry to permit increased competition with other nations.

The government increases regulatory activities, student activitism increases, businesses focus more on minority interests, and the labor force remains constant as older workers offset losses in younger workers. Employees become a greater part of the organization, with a "sense of family" due to greater flexibility of benefit options and communication of institutional directions.

Technological impacts increase life expectancy and lead to development of new drugs, miniaturized and powerful computers increase productivity in the service sector but computer crime increases and ethical questions are raised about organ transplants and life extension proposals. Economic growth on long-term basis about 1.5% annually.

UNLIKELY BUT POSSIBLE HIGH-IMPACT EVENTS

There are events that have a low probability but potentially a major impact, or others with seemingly minimal impact, while still uncertain, have sufficient likelihood that their impacts will be significant. These types of events need to be planned for, not because they might occur, but because the exercise of thinking through the possible implications for the university will lead to better understanding and responses to all types of uncertain events. A recent example of this type of event would be AIDS. A new disease with rapidly escalating costs but also understanding, and secondary impacts beginning to show up (e.g., increases in health/life insurance rates, revised sanitation procedures in the medical profession). While any one event may not have a high probability, it is likely that some event of this type will occur within the next 20 or so years.

POSSIBILITIES OF SUCH EVENTS INCLUDE:

BIOTECHNOLOGY BREAKTHROUGH[2]

While biological science breakthroughs are likely, the specific events and the societal impacts are uncertain. New molecular level synthesis becomes available on a large scale, allowing multiple new drugs, new pesticides, new immunizations for major diseases, and new industrial products.

This may cause:

- Significant increases in the life span with the resulting impacts on retirement, job openings, and leisure time activities.
- Increased conflicts about who receives these life-sustaining drugs or operations.

CALIFORNIA MIGRATION CHANGES[3]

The rate of in- and out-migration between Arizona and California is significant and is the most volatile of all state transfers. In 1984-85 California accounted for 23% of all out-migration and 16% of all in-migration. If there were something that changed that ratio, it could significantly affect the net growth rate of Arizona.

Some examples might include:

- Increasing concern in California with quality of life factors such as urban congestion, air pollution, leisure time distances, and crime (although several of these factors in Arizona are approaching the same concerns as in California).
- Increasing job relocation to Arizona due to costs of doing business in California.
- Increasing concern in California about potential earthquake hazards, either through fear of the "big quake" or by experiences with a series of smaller quakes. The probability of a big quake in the next 30 years has been placed between 40 and 60%, and smaller quakes occur with some frequency.[4]

The migration history has largely involved Whites rather than being reflective of the California ethnic mix. This could change.

ECONOMIC DEPRESSION[5]

Actions taken by the US to stimulate the economy and to mitigate the national debt and related international debt prove ineffective.

- Unemployment increases dramatically and values of institutional and private investments fall; inflation increases rapidly, multiple bankruptcies cause assets to change hands with assets deflating in value.
- People do not participate in society but retreat into small "trusted" groups; spending and investment drop markedly, living standards drop, and the world power of the U.S. declines markedly.
- Society becomes barbaric due to confusion, lack of historic support structures (extended family), and lack of ability to be self sufficient.
- Chaos develops as people struggle to cope and business and government find ways to manage the situation under difficult conditions.

INSTABILITY IN MEXICO[6]

The population of Mexico is 84 million in 1987 with an anticipated 105 million in 2000 and 138 million in 2020. The proximity of a third world country to the developed country status of the United States causes increased stresses for those dealing with both countries.

- The long-standing political vitality of the ruling PRI party is becoming vulnerable to challenges. The steady control of a single party system on the general economy and social structure loses this stabilizing influence.
- International debt continues to drain necessary capital from development and needs generated by rapid population growth.
- Long-standing tensions between the varying economic classes intensifies as greater differences between the haves and the have-nots become evident.
- Changes in settlement along both sides of the border due to immigration

will affect communities in the Southwest (perhaps an Arizona version of multicultural Miami, Florida), and border relationships (militarization, by both nations, of the border?).

MAJOR U.S. NUCLEAR ENERGY ACCIDENT[7]

There have been several events of the energy production type in the recent past (Three Mile Island and Chernobyl power plants) but there are additional nuclear-related possible events. With increasing tension in the Persian Gulf and new concerns for atmospheric pollution (Greenhouse Effect and Acid Rain) the interest in nuclear power has been renewed.

- Accident-related electrical power plant breakdown with loss of atmospheric radioactivity.
- Damage to structures (e.g., earthquakes, structural decays) containing radioactive materials which then contaminates underground water sources, or disrupt transportation facilities.
- Terrorist attacks on nuclear facilities or theft of radioactive materials.

MIDDLE EAST INSTABILITY[8]

Tension in the Middle Eastern countries is not likely to abate soon, and the potential for some disturbance is high. Possible impacts include:

- Conflict or political choice to disrupt the flow of international oil, causing a ripple effect throughout the oil consuming countries and a new version of the mid 1970s energy embargoes. In the initial 1973 embargo, the United States imported 17% percent of its oil from the OPEC countries; in the 1978 price shock it was 31%, and in 1987 the figure was 18% percent; the dependence on OPEC countries has been growing since 1985 after an eight-year decline.
- Political instability leading to limited and conventional war by major countries, or nuclear war by terrorist groups. Implications of additional terrorism in US precipitated by actions taken by the US in the Middle Eastern (or other) area.

SPACE MANUFACTURING[9]

New manufacturing techniques available only in space become economically viable.

- Separation of drugs into high purity components under zero gravity conditions to make available new disease combating tools.
- Crystal formation under zero gravity conditions produces new materials for high tech manufacturing.
- Low cost development of materials from the moon allows construction of space station capable of harnessing solar energy and beaming this energy to earth.

EARLY RESPONSES TO GREENHOUSE EFFECT[10]

The greenhouse effect is caused primarily by release of carbon dioxide into the upper atmosphere, causing the sun's heat to enter the earth's atmosphere but not to be released. This warming observation is similar to how a greenhouse functions (sun's rays enter but the heat stays in), and it has been referred to as the "greenhouse effect." The long-term impact is a gradual warming of the world. The short-term impacts (next decade or two) might include:

- Gradual warming in upper latitudes causing ocean rises and flooding of coastal areas.
- Gradual increase in frequency of drought in agricultural areas and associated underground water supplies; movement of the food production zones of the US to a northern direction.
- Increasing perception of business and industry concerning moving to Arizona because of fears of future water shortages.

TERRORISM STRIKING UNITED STATES[11]

Terrorism comes to U.S. soil as a result of worldwide terrorism and increasing conflict in specific parts of the world.

- Disruptions in electrical transmission systems and power generation plants.
- Societal disruption by release of toxic materials or contaminated water supplies within large urban areas.

IMPLICATIONS FOR ARIZONA UNIVERSITIES

EXTERNAL ENVIRONMENT

The universities exist in a broad environment, where trends are continually changing. Some possible events will affect the university primarily from the outside (e.g., economic conditions, demographic shifts), but others will be more subtle (e.g., student interests, minority enrollments). All will require monitoring the environment to become aware of the close relationship of the state and the community with the universities.

ENROLLMENT

Enrollments are shifting to accommodate more nontraditional students, but these increased enrollments may not necessarily cause increased numbers of students on the physical campus (through use of communications technology or off-campus centers). Increased competition will exist in the 1990s as the nationwide high school graduate pool declines. The range of possible external events and options open to university administrators allow for wide ranges in enrollment projections, although with the exception of the next five or so years, the projections are all growth oriented. Private institutions for higher education in Arizona may become increasingly important.

PROGRAMS AND CURRICULUM

Academic programs (teaching and research) will shift slowly to include more interdisciplinary studies (while continuing to maintain strong traditional disciplines), lifelong learning needs of a changing workforce, and a student body changing by age, values, and location. Increased emphasis on international studies, with particular reference to the Pacific Rim countries and Mexico. Some programs will be eliminated and others will take their place. The curriculum is likely to become more flexible, with more interdisciplinary offerings, more attention to undergraduate critical thinking skills, and be obtainable on- or off-campus at a variety of times. Disciplines may have increased blurring of their edges as a renewed interest in interdisciplinary programs surfaces. The problems and opportunities of both society and research needs do not necessarily fit the traditional academic disciplines; those universities that have flexibility to allow new programmatic structures will be at a competitive advantage. Program duplication or needs for a "critical mass" to allow an offering will come under increasing review.

MANAGEMENT

The university could respond as many business and government institutions will respond to the changes in increased efficiency and decreased middle management, and increased communication and involvement with workers and clients. Changes in the infrastructure of universities are likely as new requirements are faced and as older processes are replaced by those more efficient. New activities in assessment of a quality product and of affirmative actions toward minority students will increase the administrative costs.

RESOURCES

Resources will become more difficult to obtain, and may have additional constraints on use. Competition will increase on federal and private funds as other universities increase their focus on excellence as the Arizona universities are doing. The physical and capital infrastructure of the university will be increasingly of concern. As rapid change takes place, especially in high technology fields, students and researchers must have relatively modern equipment to function. This rapid change of the technology outpaces the ability of the "system" to respond to replacing equipment and facilities.

UNIVERSITIES AND THE COMMUNITY

The relationship of the university to the community could become more positive or negative, depending on the perception of university actions and their reasons by the community. Within this context, community includes citizens, business, industry, and government. It also includes the faculty, staff, and student community within the university. We determined some viewpoints in our surveys and discussions which indicate that improvements in the area of community relations suggest special attention should be placed here.

IMPORTANT CHOICES

The strategic planning process is the mechanism to effect changes within the university structure. The range of new needs for the university will necessitate discarding or restructuring some of the old. Continued interest in excellence and competitiveness will require that resources be focused in few areas. Some of the central issues might include:

- Undergraduate quality and citizen access (including the impacts of enrollment caps either at the discipline or university level.
- Academic program selections for reallocation of existing and allocation of new resources based on: 1) maintaining excellence, 2) achieving excellence for departments already good, 3) maintaining average effort, 4) maintaining minimal effort, and 5) phasing out a program or activity (or combining with another program or department).
- Academic program selections for emphasis based on national or

international audiences compared to state audiences.

- Relative emphasis on programmatic choices (e.g., building disciplines) or on infrastructure (e.g., building support activities).
- Determining university-wide priorities vs college priorities.

Addressing strategic questions is difficult. However, if it is done openly and forthrightly the choices made today will allow significantly different futures for our universities. While there is much uncertainty about the future, there is also a considerable listing of high probability trends that are not adequately addressed in our current planning and analysis efforts.

TOMORROW'S ARIZONA UNIVERSITIES: A VISION

Within the next 20 years there could be significant changes in the university or the university could look very much as it is today. The difference is how we well we understand the future options and how well we make today's decisions.

The university is likely to have a very different student mix, with a much greater proportion of students of nontraditional age and special classification taking classes in nontraditional ways at the locations of their choice. Instructors will include teams from several different universities providing the lecture, and in private electronic communication with the students. The role of the university in overall society could be much more significant than today, as the basic function of the university (acquisition and transfer of knowledge) meets the new technologies developing in society.

Research will be both specialized and interdisciplinary, and will serve the nation and world as well as the state in both basic research and applied problem solving. Because of the continuing rapid growth of available information, specializations in "certain generalities" will emerge, as the specialists become too specialized for broad communication with other members of society.

Faculty, staff, professionals, and administrators will have their knowledge device (today we refer to this as a computer terminal) available both for information for decision support and also as a consultant on difficult issues; this will function by new data storage techniques and artificial intelligence interactions with the computer.

The university is a unique structure in both historic and modern society. It is one of the few places where the difficult issues can be debated in an open forum and the dialogue is available for public viewing and involvement. It is an institution that involves both teaching existing knowledge and researching new knowledge, as well as providing new information and cultural events to the public.

TODAY'S ARIZONA UNIVERSITIES; A STATUS REPORT

The Arizona universities have made significant changes in their curricula and programs over the last 25 years.[12] There are still clear traces of the historic past of each university, and the differing clientele for each are reflected in the types of degrees awarded[13]:

Arizona State University

Bachelor Degrees	Masters Degrees	Doctoral Degrees
Business (30%)	Education (22%)	Education (40%)
Education (11%)	Business (18%)	
Engineering (8%)		

Northern Arizona University

Bachelor Degrees	Masters Degrees	Doctoral Degrees
Business (19%)	Education (60%)	Education (83%)
Education (14%)	Business (18%)	
Social Science (6%)		

University of Arizona

Bachelor Degrees	Masters Degrees	Doctoral Degrees
Business (25%)	Education (25%)	Education (30%)
Engineering (15%)	Engineering (13%)	Phys. Science (11%)

National Average

Bachelor Degrees	Masters Degrees	Doctoral Degrees
Business (24%)	Education (27%)	Education (23%)
Education (10%)	Business (23%)	Life Science (10%)
Engineering (10%)		Phys. Science (10%)

The greatest changes in the universities have occurred in building certain disciplinary strengths (Engineering at ASU, Physical and Biological Sciences at the UA, and Education at NAU) and their attraction for externally generated research and development funding. While the Arizona universities are clearly different, they also have some remarkable similarities, and are maturing campuses.

MOVING TO THE FUTURE

The strengths of the universities today partly mirror the expected changes in the future needs and events. But they also are lacking programs in some areas that will be important in the future, and these areas will have to be evaluated for possible emphasis by the universities. As Arizona is a rapidly growing state, we can take advantage of that growth as resources continue to be made available for higher education. For example, an annual 3.5% growth rate produces a 20 year doubling time; if we were to add resources to a particular area at 3.5% per year, in 20 years that area would have twice the funding of today.

The universities of 20 years hence will be able to take advantage of significant changes in newly available technologies for delivering knowledge. The expertise associated with the many disciplines at the universities will be available to the state as we move thorough times of uncertainty and possible crisis. Some things will remain, as the universities will also continue to be areas of fundamental inquiry into new knowledge and provide basic education to Arizona citizens. The university will not simply steer itself into the future. It will take strong leadership and committed participants. While other institutions have made dramatic changes, the external conditions were more conducive to some of those changes in the past.

There are several guiding principles to help us get to a desirable future for the universities.

o Develop an understanding of likely future changes in the external environment, professional directions, and societal needs.

o Identify institutional strengths and weaknesses and match these to these external changes, finding the best match for selected areas in which to focus effort.

o Maintain a high degree of flexibility to allow rapid response to changing circumstances, but move with general consistency toward a "vision" of where the university should be going (so not every opportunity should be taken).

The first two guidelines are descriptions of a strategic planning process. The third guideline is difficult to manage but necessary considering the turbulent and unpredictable times in the next decade or so.

CONCLUSIONS

When previous studies (national, state, university) are reviewed, it is clear that many issues identified in this paper are not new. The challenge, therefore, is less in recognizing problems and identifying possible solutions, than in developing a means of implementing study results.

Because of the changes taking place both inside and outside the universities, we will have to develop outlooks that allow us to:

1. Understand the need and develop the means to operate under conditions of uncertainty, including an ability to accept the unanticipated and be prepared for sudden changes in the familiar; and initiate decision-making capabilities that allow flexibility and swift movement with autonomy within an agreed upon set of directions.
2. Identify realistically the internal strengths and weaknesses of the universities so the value of understanding external conditions can be fully realized.
3. Forecast accurately the enrollment futures of the universities even though the range of possible futures for Arizona is large.
4. Understand that many of the changes will have both positive and negative effects on the institutions and society,
5. Find and know how to use relevant information from among the vast amounts of available data.
6. Recognize that Arizona has a population in transition; during the early 1980s, for every four persons coming to the state three left. This makes it difficult to secure popular support for major investments in the state infrastructure.
7. Understand that local population shifts are occurring that are causing the population to become more multicultural with a rising number of Hispanics and American Indians. Additional assimilation is occurring for Asians and Blacks.
8. Realize job classifications will shift, requiring retraining and the use of telecommunications technologies for new distance learning or continuing education programs.
9. Recognize the need for accountability and assessment of product outcomes by educational institutions.
10. Realize that the pressure by minorities on the establishment organizations will continue to increase, forcing changes externally to the universities unless positive actions are taken by the institutions.
11. Recognize that institutions must develop the capability to evaluate and understand potential "ripple" effects of apparently simple decisions or events occurring either in the university or the environment.

RECOMMENDATION[14]

THE ARIZONA UNIVERSITIES SHOULD DEVELOP FORESIGHT CAPABILITY IN SUPPORT OF BOTH STRATEGIC PLANNING AND CURRENT DECISION PROCESSES.

In developing an ability to anticipate possible future alternatives (foresight), the Regents' staff and the universities should identify information sharing roles. The role of the Regents' staff should be focused on the broad issues which are factual and useful to all the universities (e.g., demographic trends, national educational policies, and regional needs). The role of the universities should be cooperative and complementary, while taking advantage of the special skills at each institution. The data and tentative conclusions should be shared fully by those participating in the process. This process should pay particular attention to possible discontinuities in trend extrapolations, identify emerging trends, and develop scenarios to understand the effects of unlikely but possible events.

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FUTURE CHANGES: IMPLICATIONS FOR ARIZONA'S UNIVERSITIES[15]

PART II: BACKGROUND STUDIES

NATIONAL STUDIES AND SOURCES

GENERAL ISSUES

These trends and issues area selected from the last year (July 1987 to July 88) of the Future Survey, a monthly publication identifying emerging issues within 17 broad categories.[16]

TECHNOLOGICAL

- Computer crime (relationship to economy and security) will grow
- Shortcomings of computer files causing legal issues to be raised
- Computer based instruction in formal education and in other training activities
- Artificial intelligence will increase "user friendliness" with technology
- Computer changes will bring about small, inexpensive, powerful computers. Impacts will be on storage/retrieval, group communication, medical components and robotics
- Training and education by communications will increase rapidly in next 10 years
- New forms of information transfer will become important (videotex, hypertext, CD-ROM); but beware of infoglut concerns about dealing with too much information.
- Biological revolution can increase great changes at the molecular level (could invite more regulation, lawsuits, and ethic considerations as well as major advances in industrial production, medicine, and agriculture); likely biochips for processing.
- Increased use of technology assessment for resolving large expenditures and major public policy issues (such as health care cost containment)

ECONOMIC

- Global competition, revival of older industrial cities at northern latitudes (with new technologies making northern cities livable).
- Corrections of current economic imbalances will be difficult and US, with shifts from consumption to production and saving.
- US is moving in several directions: to service/leisure society, shifting political orientation from conservative to liberal, declining politically and economically, moving to global economy and communication.
- The current economic situation suggests recessions or worse.

- Shift from military to economic competitiveness of super powers
- Threats to future prospects of employment
- Possible decline of US in world economy (not unlike British at end of 19th century).
- Overly optimistic forecasts lead to bad policy and crisis
- International economic shifts to the pacific basin
- International labor shifts as Japan and US become post-industrial
- US economy becoming bicoastal
- Management of organizations is changing in response to environmental and technical change; training in how to deal with corporate change is necessary
- Economy will slow noticeably in next few years and the consumer boom will end
- Labor force growth rate will decline (baby boom effect) causing firms to rethink the human resource policies
- Business "teams" will increase to target issues regardless oforganizational structure
- Standards of living in US are improving at a slower rate than in the past; low income grew least and high income grew greatest since late 1960s
- Shifts of the baby boom to retirement years in early 21st century will require restructuring of public and private retirement systems and redefinition of the term retirement.

DEMOGRAPHIC

- Aging of the population
- Widening age gap in different parts of world and increasing young in third world will exacerbate differences in developing and developed countries
- New immigrants and minorities
- World population continues to grow and related problems continue
- Pressures to migrate to the US are likely to increase (lowering of new entries into job force of US natives and population pressures in developing countries

HEALTH AND ENVIRONMENT

- Need for global sustainable development (issues of population exceeding the carrying capacity in some areas)
- Major health threat and responses to AIDS
- Uncertainty about environmental knowledge and impacts will bring advances and failures
- Need for interdisciplinary links/connections rather than narrow analysis and linear pursuit of narrow and uncoordinated objectives
- Inadequately addressed major environmental issues include: food production, soil erosion, and environment, toxic and solid waste production and management, risks associated with air pollution, and protecting biological diversity

- Actions are likely to be taken to head-off anticipated global warming trend of greenhouse effect (anticipated mid 21st century but increasing concern it could be more sudden than believed).

- Changing medical practices from "physical/biological" to "biocultural" for the whole complex of the patient

- Emerging health issues include cancer links with electrical radiation, and greater emphasis on drugs and alcohol, with continued concerns for chemicals and their effects on people

- Growing salinization, possible water shortages, forest declines internationally, alternatives to oil development

- Employer investment in preventative medicine pays off

- Urban congestion in transportation and airports increases

- Decisions will have to be made on who gets medical care with increasing number of old and increasing costs

- Medical ethics and right to die or right to treatment (rationing health care related to scarce technological resources and financial costs).

- Need for long term health care, involving access, resource availability, legislation, and financing methods

- Cost effective energy efficient options exist but existing barriers and subsidies favor existing methods

- Growing conflicts between solving energy futures by conservation and renewable sources vs nuclear power (complicated by the concern over growing US oil imports and global warming trends due to fossil fuel burning).

SOCIAL

- Increasing amount of information causes problems (too much to absorb) as well as advantages (get new views or data)

- We don't know very much about "futures analysis" but it is more complex than typical forecasting and involves uncertainty and options more than extrapolation

- Reconstruction of the national purpose

- Increases in enforcement of violent and property crime

- Shift of legal enforcement to citizens and private police from official police

- Terrorism (building from US involvement in affairs of other nations) or due to other reasons

- Massive urban unrest and civil disorder similar to 1960s (by 2000)

- Drug war continues to be lost even though some battles are won

- Changes in prison roles (alternatives) due to overcrowding

- Changes in Mexico will influence US/Mexico relations (possible democratization of political process and severe economic crisis)

- Addressing adult literacy needs (this area in becoming increasingly important and has high potential payoffs).

- Educational needs change from teacher certification and admission or graduation requirements to one where math and science, general literacy, and social/moral implications of technology, reasoning skills, capacity to adapt to change, and more creativity.

- Internationalization will cause education for global responsibility (foreign language competency, business expertise, information flows, professional expertise)

- Four tier US class structure (upper and upper middle class professional and managerial, middle class of technical and skilled workers, service class, and underclass)

- Traditional US social structure changing (middle class is shrinking) but future implications are not clear

- Increasingly hopeless underclass with widening gap from other classes

- Threats to families by making child rearing more difficult (especially economically)

- Increasing number of poor households

- Increases in "family support centers" with or without government assistance

- Self reliant communities through new financing and cooperation
- Increases in role of government in society (perhaps state more than federal).

Political

- Political cycles (30 year) will be evident by early 1990s with a shift to reform, idealism, liberal phase

- Shared international leadership in space exploration and majorproblems (AIDS, drugs, environment, arms control); the reasons are compelling but the real actions or results require caution

- Increases in international cooperation for security and economy

- Third world development moves from simple economic to integrated

- Increases in government involvement related to security, health, and safety

- Treatment of extreme views on change by combination of factors (cooperation and competition, regulation and free market, generalists and specialists)

- Prevention of some potential terrorism by redefining nationalinterests of US

WORKFORCE 2000

In 1987 the Hudson Institute completed a study for the U.S. Department of Labor titled "Workforce 2000: Work and Workers for the 21st Century". That study concluded that four key trends will shape the last years of the twentieth century (emphasis in original):

- The American Economy should grow at a relatively healthy pace, boosted by a rebound in U.S. Exports, renewed productivity growth, and a strong world economy.

- Despite its international comeback, U.S. manufacturing will be a much smaller share of the economy in the year 2000 than it is today. Service industries will create all of the new jobs, and most of the new wealth, over the next 13 years.

- The workforce will grow slowly, becoming older, more female, and more disadvantaged. Only 15 percent of the new entrants to the labor force over the next 13 years will be native white males, compared with 47 percent in that category today.

- The new jobs in service industries will demand much higher skill levels than the jobs today. Very few new jobs will be created for those who cannot read, follow directions, and use mathematics. Ironically, the demographic trends in the workforce, coupled with he higher skill requirements of the economy, will lead to both higher and lower unemployment, more joblessness among the least-skilled and less among the most educationally advantaged.

The Hudson Institute further notes that there are six challenges:

1) stimulating balanced world growth,

2) accelerating productivity increases in service industries,

3) maintaining the dynamism of an aging workforce,

4) reconciling the conflicting needs of women, work, and families,

5) integrating Black and Hispanic workers fully into the economy, and

6) improving the education and skills of all workers.

In its annual Occupational Projections and Training Data, the US Department of Labor projects the fastest growing and declining occupations from 1984 to 1985.

Growing	**(% Increase)**
Paralegal personnel	97.5
Computer programmers	71.7
Electronic data process	68.7
Medical assistants	62.0
Data processing repairs	56.2
Electronics engineers	52.8

Declining	**(% Decrease)**
Stenographers	-40.3
Shoe machine operators	-31.5
Railroad brake/switch	-26.4
Railcar repairers	-22.3
Furnace operators	-20.9
Shoe workers	-18.6

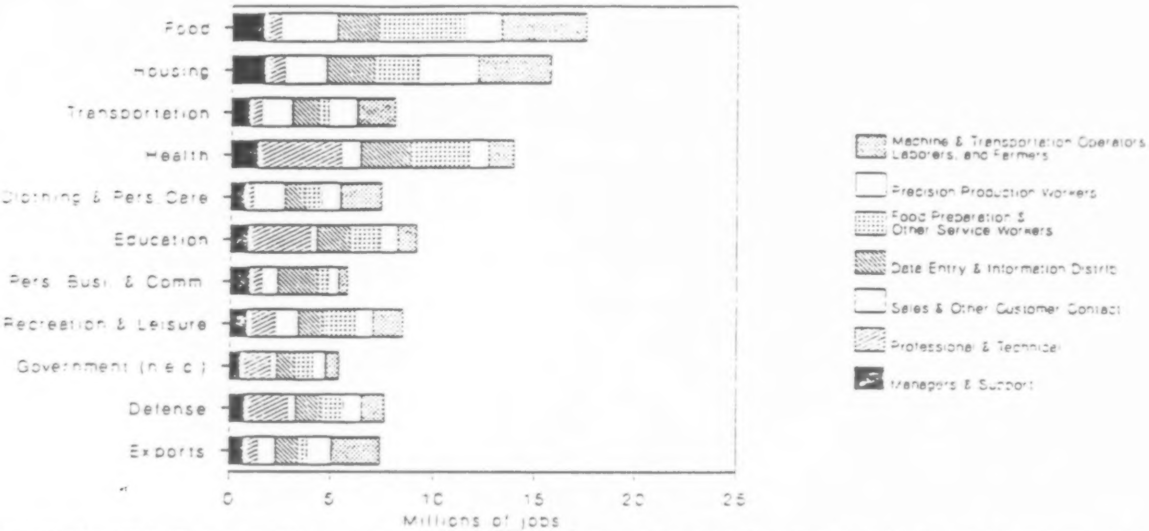
TECHNOLOGY AND THE ECONOMY

In 1987 the Congressional Office of Technology Assessment (OTA) completed the study "Technology and the American Economic Transition: Choices for the Future." Their conclusion is:

"During the next two decades, new technologies, rapid increases in foreign trade, and the tastes and values of a new generation of Americans are likely to reshape virtually every product, every service, and every job in the United States."

The four-year study took a new approach of understanding the interactions between the economy and technology, by breaking the economy into ten components (food, housing, health, transportation, clothing and personal care, education, personal business and communication, recreation and leisure, defense, and government activities not elsewhere classified). The types of jobs allocated to these ten categories are shown in Figure 2.

Figure 2. Jobs Required to Provide for Category Amenities in 1984



How To Read This Figure: In 1984, the U.S. economy produced approximately 107 million jobs. Of this total, approximately 17.5 million jobs resulted from the production of food for U.S. households and government. Of these, approximately 1.6 million jobs were created for managers and management support occupations. All reported jobs in the U.S. economy are recorded somewhere in this figure.

SOURCE: Office of Technology Assessment (see table 10-6 of ch. 10).

They determine there are four new rules which are shaping the operation of the economy:

- New technologies (primarily those built around microelectronics);
- The loss of U.S. preeminence in the international markets;
- The possibility that the price of energy and other resources may increase sharply by the turn of the century; and
- Changes in consumer and labor markets and a new attitude toward public regulation of economic activity, resulting - at least in part - from new values and tastes.

While there is a good deal of discussion in the OTA report, they note that the Nation's educational system may be "on the brink of a major change" (resulting from a fundamental change in demand for educational services and the newtechnology making it possible to consider improvements in teaching and learning productivity). In addition, they note that earlier economic transformations were associated with major public infrastructure investments (railroads, highways, electrical transmission lines), but the current transformation seems to involve an "educated population."

DEMOGRAPHIC CHANGES AND ECONOMIC AND SOCIAL CONSEQUENCES

In 1986 a subcommittee of the U.S. Congressional Joint Economic Committee held hearings titled "Demographic Changes in the United States: The Economic and Social Consequences into the 21st Century." The basic purpose of the hearings was to better identify the impacts of the demographic changes on education, labor, housing, health care, retirement, and the federal budget. The questions raised include: implications of an aging society (including institutional adaptation, health needs, jobs, economic support), slower growth rate of labor force allowing "at risk" youth greater opportunities in the job market, educational system capabilities in preparing a workforce requiring higher skill and competencies, increasing percentage of minorities (which make up greatest proportion of poverty and unemployment), increased need for cooperative efforts of labor and management, and caring for dependents (day care for young and varied care options for old). The major change in the proportion of "older" people will occur about 2010, as the baby boom population enters the late 60s.

In a related study a year earlier, the Office of Technology Assessment developed a report "Demographic Trends and the Scientific and Engineering Work Force." OTA concluded "that career choices and market forces have a greater impact on the supply of scientists and engineers than do demographic trends"; they further note that it is difficult to forecast the supply and demand of scientists and engineers, with the exception of academic market, which is expected to be weak over the next decade but strong after 1995.

The Congressional Research Service in 1983 identified ten emerging issues:

- Labor Force
- International Trade
- Information Society
- Changing Governmental Institutions
- Education
- Natural Resources and Food Scarcity
- National Infrastructure
- Armaments
- Research, Development and Innovation
- Health Care

The United Way of America develops an annual summary of changes talking place in the social, economic, political, technological, and other specialized areas. Some key observations (those not repeated elsewhere in these summaries) include:[17]

- Growing concerns around issues of generational equity
- Continued growth of single-person and single-parent households

- Continued high poverty rates in female-headed families
- Revival of confidence in institutions and businesses
- Continued growth of the corporate classroom
- Increased attention to illiteracy in U.S.
- AIDS epidemic increasingly critical; drug use to become more visible
- Slowdown in recent erosion of middle class
- Number of children in poverty to grow, increases in runaways
- Greater availability of child care and flexible hours in workplace
- Prevalence of conservative mood and regrouping of Democratic party to more conservative agenda
- Growing influence of state legislatures and decentralization of government
- Revised patterns of individual and corporate spending due to new tax code
- Significant growth of alternatives to courtroom litigation
- Advances to occur in microelectronics, biotechnology, telecommunications, computers and materials development
- Continued ethical concerns over technological advances, particularly in biotechnology
- Most new jobs in high-tech industries will be in nontechnical service areas
- Growing problem of workers displaced through technological advances
- Continued difficulty in maintaining a work force with sufficient high-tech skills
- Increased corporate support for human services not previously supported (e.g., drug abuse, child abuse).

MAJOR TRENDS

There are several available listings of "trends" as seen from the perspective of person or group preparing the listing. Some have been identified in this section on National Studies and Sources, others that are more focused have not been listed. One recent study is worth further identification because of comprehensive nature.[18]

Trends (71 overall) are identified for the following categories:

- General Long-Term Societal Trends (9)
- Technology Trends (8)
- Education (8)
- Labor Force and Work (14)
- Management (5)
- Values and Concerns (9)
- Family (11), and
- Institutional (7)
- Only the education trends are listed below:

1. **Expanding education and training throughout society.**

   Increases in federal spending for specialized programs, the knowledge half-life is decreasing requiring constant retraining, more well-paying jobs will required advanced education, schools will train both children and adults, professional alliances between high school and college faculties will grow, and state/local/private agencies will play a greater role in training and adult education.

2. **New technologies will greatly facilitate the training process.**

   Modules will combine computers/video disks/instrumentation to duplicate the work environment, computer models will provide training in alternatives/options, telecommunications will allow course-work to be shared with other school districts or students in another state or country, and education will become more individualized to allow learning according to needs and abilities.

3. **Greater role of business in training and education.**

   The investment of corporations in employee education and retraining is large ($80 billion) and will double by 2001, half of funding for formal training will come from the 200-300 large companies but most new jobs will be generated by small businesses that cannot afford to pay for training.

4. **Education costs will continue to rise.**

   Heavy pressures to control costs will emerge, two-year colleges and associate degrees will grow, and loans rather than grants will constitute the main source of student financial aid.

5. **Educational institutions will be more concerned with ways to assess outcomes and effectiveness of educational programs.**

   Greater emphasis will be placed by the public and the legislatures on the outcomes of public education, faculty/departments will support efforts to assess their classroom/program performance/results and effectiveness.

6. **Improved pedagogy - the science of teaching - will revolutionize learning.**

   Institutions will increasingly apply the growing knowledge about individual cognition to educational situations, the learning environment will not be as important in the future as individuals learn more on their own (places of learning will be more dispersed and the age of initial learning will depend on the individual not tradition), computer supported learning techniques will allow greater material to be learned, and alternative testing approaches will provide better feedback.

7. **Universities will stress development of the whole student and how the university's total environment affects that development.**

Faculty will receive greater support from the administration for class-related activities, and individual students will receive more support from faculty/advisors on decisions about programs and career paths.

8. Reduction in size of higher education institutions.

Private commercial ventures will provide large electronic databases which will eventually replace the university library, students will adopt the "scholarship" mode of learning by consulting books and journals much as professors and graduates students do today, college and university instructors will find employment at secondary schools or business-based educational programs and in producing educational software, and more businesses will conduct research for themselves rather than turning to the universities.

NATIONAL AND REGIONAL ECONOMY

Wharton Econometric Forecasting Associates in their 25-year outlook (February 1988) note that:

- The demographic shift will put a strain on the health care and retirement systems;
- Jobs will be created but the relative size of the young, high-unemployment cohort of the labor force will shrink, causing a decline in "unemployment";
- Federal spending will be slow growth until the deficit is brought under control (about ten years);
- Trade balance will begin to turn positive in late 1990s; and
- The overall economy will grow at an average annual rate of 2.6% during the next 25 years (split about equally between employment and productivity growth). The cyclical scenario estimates a recession in 1990 and 1995.

The 16-member states[19] of the Western Governor's Association (WGA) developed a 1986 report titled "The Western Economy in Transition: Nature, Causes, and Implications." While the characters of the states vary widely, several overall conclusions can be drawn:

- Slowing population growth in most western states is a reflection mainly of greatly reduced in-migration, reflecting an aging population which has become considerably less mobile (Arizona and California had the greatest growth rates);
- The western region is in the midst of a profound transformation and reorientation;
- The prosperity of the western region during the 1970s and early 1980s was due in large part to external forces rather than indigenous economic development;
- The basic industries of the West are declining (agriculture, forestry, minerals); and
- The per capita federal outlays are equal or above the national average.

The WGA long-term outlook concludes that we should

1) rethink economic development (greater focus in internally generated growth than enticing forms from outside the region);

2) recognize the false promise of high technology (jobs are limited, locations few, repeats of "Silicon Valley" are unlikely); and

3) exploit opportunities in the job generation process (economic diversification).

SPECIAL MINORITY ANALYSES

Demographic trends over the next decade and a growing sense of social and political activism among minority citizens of the state could combine to have an important positive or negative impact upon Arizona's universities, as early as the mid-1990s. After the 1990 census is taken, the potential for much greater representation of minorities in the Arizona Legislature is likely to be realized.

Minority leaders in Arizona view education, especially higher education, as their "Key to Empowerment", to quote from the theme of the 1988 Arizona Chicano Conference. Current Hispanic legislators and prominent Hispanic citizens say that there is a perception by Hispanics that the universities are not making the contribution they should to minority education; they also feel that there is a "lack of will or desire" on the part of the universities to implement policies that are already in place. American Indians, because of their lack of success in higher education, should be an area of special concern to the state universities.

Minority legislators, especially Hispanic legislators, will become increasingly important players in the Arizona political arena. They are already wondering if "the universities can reform themselves".

If the universities are responsive to the educational needs of the state's minority population and involve minority communities in the process, the universities will find strong support for the future of higher education; if they are not, there may be increased interest by some minorities in working against the universities.

Two recent reports discuss the minority trends. First, the regional WICHE Minority to Majority Study[20]. This study focused on the five-state Southwestern region (Arizona, California, Colorado, New Mexico, and Texas.

First, the study identified one goal: "Educate for a Multicultural Society." The following recommendations were developed:

1. Recognize the diversity of students, and reflect that diversity in educational policies and practices.

2. Integrate diverse cultural perspectives into the overall educational process.

3. Ensure that all students become fully proficient in the English language while recognizing the value of multilingualism for individuals and society.

4. Expect all students to succeed, and make sure this expectation of success is shared by teachers, administrators, parents, and students themselves.

5. Provide a core curriculum at the elementary and secondary levels that challenges all students and prepares them for the next stages in their eduction.

6. Give top priority to the dropout problem at the elementary and

secondary levels.

7. Involve states more directly in halting the loss of minority students from the educational system.

8. Improve recruitment and selections procedures in the interest of increasing the number of minority students in higher education.

9. Individualize student assessment and student services.

10. Increase retention rates of minority students in college through comprehensive and integrated programs.

11. Coordinate academic programs and provide the support necessary for students to move more easily from high school to college, from two-year to four-year institutions, and from degree completion to employment.

12. Increase the number of minority teachers and ensure that these teachers enter into the leadership of education.

13. Bring more minority students into graduate and professional education.

14. Increase retention in graduate and professional programs by creating an environment that supports minority students and fosters strong faculty-student relationships.

15. Build a network among universities, graduate programs, colleges, schools, professional groups, and business to interest and encourage more minority students to pursue graduate and professional degrees.

16. Pursue vigorously affirmative action goals in faculty hiring, and take other steps to increase the representation of minorities in higher education leadership.

17. Restructure the methods for funding elementary and secondary education to ensure equal educational opportunity.

18. Examine the financial support for higher education and the allocation of that support in light of the economic circumstances and educational needs of minority students.

19. Halt the erosion of student aid, particularly of programs that encourage minority enrollments, and promote financial planning for college education.

20. Examine loan programs in terms of their effects on students' educational decisions and on the achievement of society's goals for education.

Second, the Department of Economic Security released a study titled "Hispanics in Transition" in 1986.[21]

The highlights include:

1. Arizona is fourth in percentage of Hispanics in the United States (NM=36.6%, TX=21.0%, CA=19.2%, AZ=16.2%, CO=11.8, NY=9.5, FL=8.8, IL=5.6); overall US=6.4%.

2. Arizona counties with the most hispanics are: Santa Cruz, Greenlee, then Yuma, then Pima, Pinal, Gila, Cochise, Graham, then La Paz and Maricopa.

3. Graduation improvements were significant between 1977 and 1981 in BS/MA (26.5%) and PhD (33.3%) degrees for Hispanics but their were significant decreases in AA (-2.7%) and MS/MA (-4.3%) for an overall gain of 7.4%

4. The major education problem for hispanics is the high drop out rate for high school: 19.7% hispanics vs 14.5% for total students for FY 85.

5. Hispanic enrollment for FY 85 was 17-18 percent for grades 9-12 and 22-25 percent for K-6.

6. More Hispanics (71%) have children compared to families of all races (50%) using U.S. 1980 Census data.

7. Age distribution for Total Arizona population has a "bulge" from the 15-19 age group through the 30-34 age group; but for hispanics it is the 0-4 age group through the 25-19 age group.

8. Using 1986 population estimates, about 51% of hispanics are less than 22 years old, and 33% are less than 14 years old. Hispanics account for about 25% of the births in Arizona (years 1980-1984).

HIGHER EDUCATION CRITIQUES

There have been a number of recent "assessments" of higher education. A separate paper lists detailed reviews of 13 of these[22]; a few highlights include:

The value of an undergraduate degree has declined; the curriculum needs restructuring; universities should be more accountable and develop assessment tools; there is a discontinuity between schools and higher education; faculty have divided loyalties (among research and teaching) and institutional confusion on purpose; universities and communities or the larger world need to increase communications; community concern for quality of education; universities should improve participation rates of all groups; and provide a range of opportunities for a changing work force and society.

MANAGEMENT AND ORGANIZATIONAL CHANGES

While there are a number of studies relating to the response by management to some of these anticipated changes, two reports will suffice to summarize the leading thought on the subject.[23]

First, Donald Michael reports:

"Most organizational cultures are drastically unfit for meeting the challenges confronting them as they move toward the 21st century, especially organizations such as universities that must operate at high levels of uncertainty. To cope constructively, the university culture must perform as a learning organization, continuously asking the questions: Where do we want to go? How do we get there? Are we getting there?

The broadest overriding observation about the societal context is that the dominant myth systems are facing multiple challenges, and growing amounts of information are increasing these uncertainties. The contentious and information-rich societal context is certain to confront the university with multiple claims regarding priorities, services, opportunities, and claimant legitimacy.

The new competence for performing resiliently in the turbulent environment has five attributes:

- The ability to live with and acknowledge high degrees of uncertainty;
- Embracing error: discovering what is not going as anticipated; and using these discoveries to learn, revise, and experiment anew;
- Being future-responsive: considering multiple futures and their consequences, to confront us with the ethical issues abiding in what we aspire to and what we avoid;
- The ability to span information and normative boundaries;
- Interpersonal competence: the ability to listen, support and empower others, and cope with value conflicts."

Second, to give an example of how a conceptual change might occur in organizations, Peter Drucker has suggested two models of the organization of the future. These are based on information and knowledge patterns: the symphony or the hospital, because of reduced layers of management and increased need for "task-based" team approaches to problem solving. In the first example, there are few leaders and the players are all equals in the structure but each performs a specialized role. In the second example, tasks are identified that draw specialists from various disciplinary areas for the particular medical task at hand, then the specialists regroup in a different manner for a different task. With today's information technology, both of these models become possible.

ARIZONA STUDIES AND SOURCES

Arizona Academy Town Hall Meetings[24]

The 1500 member Arizona Academy is composed of a cross section of Arizona (mostly opinion leaders) citizens and for 25 years has been holding semi-annual meetings on topics of broad interest to the membership (identified by annual survey). This group is of special significance to the universities, since each meeting is preceded by a report on the subject, which is developed by one or more of the Arizona universities.

Reports and their subjects from 1983 to 1988 include:

Post-Secondary Education

Responsibilities of News Media

Health Care Costs

County Government

Growth Management and Land Use Planning

Managing Water Quality

Social Services

Arizona's Changing Economy

Culture and Values

Arizona's Relations with Mexico

Air Quality

Civil Justice System

Results of Questionnaire mailed to membership in January 1988, requesting top three issues of concern (open ended question, numbers indicate tally of responses).

Education (K-12): 663

Mental Health (including homeless): 423

Rural/Urban interests (competitiveness): 379

Arizona Water Future: 357

Growth and Long Range Planning: 322

Responsive State Government: 291

Arizona Sense of Community: 256

Health Care (particularly long term): 236

Arizona National Posture: 230

Transportation and Highways: 214

Youth and Families: 209

Tax Structure: 201

Arizona Indian Population: 156

Arizona Senior Adults: 155

Preservation of Natural Resources: 140

Substance Abuse: 122

Public and Private Partnerships: 101

(eight other items with less than 100 responses each)

TECHNOLOGY AND ECONOMIC DEVELOPMENT

The 1983 Arizona Governor's Conference on Technology and Economic Development identified six areas that are closely related to university future activities in this area:

- o Establish Centers of Excellence in state's universities for high technology activities
- o Develop a long-term state telecommunications policy
- o Review ABOR patent and sponsored research policies
- o Explore formal mechanisms to promote technology transfer (from universities to businesses in state)
- o Set up a Council on Science and Technology
- o Increase research funding support

URBAN GROWTH IN ARIZONA:

A POLICY ANALYSIS[25]

This 336 page report was available in draft form (July 1988) for reference in this working paper. The chapter "Some Alternative Futures for Arizona" includes four scenarios. These are:

A "SURPRISE FREE" SCENARIO

Assumes generally that present trends continue. Growth would be concentrated in the two metropolitan areas, raising issues of population concentration, intergovernmental cooperation, and environmental degradation. Anticipates population growth to gain about 60 percent by the year 2000, with relatively rapid growth which fluctuates according to economic cycles.

POST-INDUSTRIAL ARIZONA:

THE INFORMATION AND LEISURE SOCIETY

Emphasizes the service economy. Increased leisure time, greater rises and falls of population due to travel and part-time residents, with growth of mid-sized cities outside the two major metropolitan centers. Suggests growth will become less important as we approach the next century and the states evolution is driven by technology rather than population.

THE SLOW-GROWTH SCENARIO

The "state religion" for growth could change based on revitalization of the rust belt so it no longer serves as a major source of migration over the last two decades; this is bolstered by a weak dollar that gives manufacturing a new life and the midwestern economy improves at the expense of the southwest, causing a reverse migration.

Faced with dramatically slower population growth, the Arizona of the future would be very different; it would be inconsistent with the state ethos and investments in the social infrastructure would be heavily needed at a time when the tax base was shrinking.

A COMPREHENSIVE STATE POLICY ON URBAN GROWTH

A view of the future looking back on the present finds the need for an "Arizona Growth Management Act." The Act was developed as a result of the growing perception that something had to be done to manage population growth on a statewide basis.

In addition, there are some "surprises along the way." There are six "unexpected" events worthy of discussion:

1. Mexican Revitalization or Revolution (two extreme options).
2. High Speed, Levitated Trains (very rapid long distance transit).
3. New Developments in Health Care (extended lifespans).
4. Urban Arizona As a Cultural Mecca (two metropolitan centers).
5. Computer Networking (electronic communication).
6. The End of Geography (broad regional development).

RECENT SYMPOSIA AND PUBLIC MEDIA[26]

The Arizona Department of Transportation held an "Arizona Futures Symposium" in October 1987. The purpose was develop a greater understanding of the next 25 years in relation to demographic, socioeconomic, and technological changes related to transportation planning. The overall "flavor" of the symposium was to recognize that prediction is difficult, there could be significant perturbations in several of the trends, and we should learn more about learning about the future (range of possibilities and positive and negative consequences).

The Arizona Republic developed a special insert for its April 17, 1988, editions. The summary statement indicated:

"Many forces that will shape Arizona's future are beyond the control of its people. International, national and regional forces will surely influence events to a considerable extent. But much of what happens here is up to

Arizonans. What crucial choices will they make on the critical issues of the next quarter century? What kind of educational system will Arizonans pay for? How much health care will they be willing to finance? What means will they use to provide transportation? Will they demand effective leadership - and assist that leadership with meaningful citizen participation - to solve state and community problems? How will Arizonans maintain the quality of life that attracted them, when the population of the state doubles in the next 25 years?

What kinds of limitations will they place on growth, water usage and air pollution? The first century of life in Arizona was spent inventing a way of life. In the next century, the tough part comes as the state's people choose how they wish to respond to the myriad challenges they face. Past choices have, in part, created today's issues and crises."

UNIVERSITY AND EDUCATION RELATED STUDIES

A 1988 study was funded by the Task Force to look at population, economy and jobs, public education, and university trends.[27] The detailed summary of this study is listed in Part II of this report.

A 1988 study was completed for the College of Education at Arizona State University "Arizona: The State and Its Educational System[28]." The conclusions include:

1. DISTRIBUTION

Increasing problems concern low-income people traveling long distances to work in high income communities to which they can never belong.

2. SMALL BUSINESS

The decline in the middle of the Arizona work force is real, with increasing numbers of jobs on the high and low income sides. The state needs to do much more in the development of minority middle classes.

3. YOUTH AND POVERTY

More youth entering school will be "at risk" which could result in even further reductions in the numbers of young people who graduate from high school. If this happens, everyone's interests in Arizona will be affected negatively (emphasis in original).

4. HIGHER EDUCATION

Higher eduction needs to be articulated with the public schools. Higher education in Arizona can be no better than Arizona's schools; at the moment, Arizona's business leaders seem to have a better understanding of this obvious fact than some of the professorate.

5. SCHOOL POPULATIONS

The schools and the legislature need a youth policy that can guide action in the area of class size (to prevent increases) and funding per student (to prevent declines); this is particularly important in a state with an increasing percentage of youth who come from non-Anglo backgrounds.

NATIONAL FRESHMAN SURVEY RESULTS

For 22 years, the American Council on Education and the University of California, Los Angeles, have conducted annual surveys for the Cooperative Institutional Research Program (CIRP).

The 1987 annual freshman survey report lists viewpoints of 290,000 freshmen in 562 colleges and universities.[29] Among the changes observed over the last 20 years are:

1) a recent resurgence in interest in teaching careers,

2) a sharp decline in interest in health careers (e.g., nursing) among women,

3) a leveling in interest in engineering careers but a continued upswing in business careers (primarily management and only among men, with a decline in interest by women in business),

4) a sharp decline in interest in computing careers after a sharp increase,

5) a slight shift of political preferences from conservative to liberal (reversing an 11 year trend) along with a decline in the middle-of-the-road preferences (the crossover occurred during the period 1981-1984), and

6) a continued interest to be very well off financially compared to developing a meaningful philosophy of life (these trends crossed in 1977).

While not listed in the CIRP surveys, there has been a resurgence in interest in courses relating to 1960s interests and student activism.[30] A summary of selected trends is in Figure 1.

Figure 1. CIRP 1987 Survey Trends.

ARIZONA BOARD OF REGENTS STUDIES

ACADEMIC AFFAIRS COUNCIL

The Board of Regents is organized into several Councils, which include the Academic Affairs Council. This Council developed as series of external and internal driving forces for academic planning guidance (draft completed in May 1986).

External Driving Forces

DEMOGRAPHIC

- Population will continue to grow.
- Traditional age students will increase in mid 1990s.
- Minorities will increase.
- Urban growth will be coupled with rural decline.

SOCIAL AND POLITICAL

- Public expectations concerning equality of opportunity will remain high (higher education a right).
- Life style will demand extensive services.
- Public concern for certain risks and for certain moral and ethical issues will grow.
- Awareness of global interdependence will increase.

TECHNOLOGICAL

- Technological changes will lead to emergence of new occupations and disappearance of old ones.

- Rapidity of technological change will result in multiple careers during a life time.
- New technology will change modes of communication and information storage.

ECONOMIC

- Economic growth will allow room for expansion but in unpredictable spurts and in stiff competition.
- State and private funding may replace federal to some extent.
- Economic growth will require strong Research and Development in Arizona.

CULTURAL

- Demand for "cultural services" will grow.
- Ethnic groups will continue to demand recognition for their cultural traditions.

Internal Driving Forces

DEVELOPMENT OF KNOWLEDGE

- Disciplines will expand and contract.
- New disciplines will emerge from interdisciplinary efforts.

DISSEMINATION OF KNOWLEDGE

- New modes of instruction will emerge.
- New modes will be less campus-bound.

RESOURCE DEVELOPMENT

- Resource development (new sources) and reallocation of resources will become even more important as program needs multiply and traditional resources remain limited.
- Certain sources will be even more closely tied to specific uses.

MANAGEMENT AND ADMINISTRATION

- Independence of universities/ academic freedom will need continued protection as demands multiply.
- Demand for accountability in resource allocation will continue.
- Planning efforts will require broad participation from inside and outside the universities.
- Flexibility will be very important in dealing with rapid change and uncertainty.
- Faculty retirements/pressures from other employers will require careful manpower planning.

FUTURE NEEDS OF THE STATE COMMITTEES"

The Board of Regents in 1985 appointed a Future Needs of the State Work Group as part of the strategic planning activities. The results of the three committees are summarized here.

ECONOMIC, DEMOGRAPHIC AND MANPOWER COMMITTEE

Population flows and Arizona employment are influenced by the business cycle; slowing during recessions and expanding during economic growth periods. The prevailing view is the "Arizona population will swell by 1 to 1.5 million people between 1985 and 2000, with the number of 18-year olds increasing from 45,000 to 71,000 (55% increase)." The Arizona economy is changing, with agriculture, mining, construction, and government are declining in importance; the most rapid growth has been in manufacturing and finance, insurance, and real estate. The relatively balanced growth across job classifications is not expected to continue, with manufacturing growing modestly and service growing more rapidly. Several specific projections are made:

- Population will continue to grow in Arizona at an average rate of three percent from 1985 to 2000, bringing 100,000 new citizens per year to the state.
- Nationally, the number of college aged students is projected to decline until the late 1990s when the "baby boom echo" (children of baby boomers now 20-40 years of age) is felt, but in Arizona the number of college age students will continue to accelerate from the present to the year 2000.
- Contrary to popular belief, the population of Arizona differs from that of the nation not in the number of elderly, but in the large number of younger cohorts 5-19 and 25-29. By the year 2000, Arizona will have a higher percentage of 18 years olds than the nation.
- During the next 15 years, the fastest growing age groups in Arizona will be the 35-54 age group and the 9-19 age group. This latter group - the baby boom echo - will begin to reach college age in large numbers by the year 2000.
- More than one-third of the Arizona population under 25 are minorities. Nearly 40 percent of those under age 10 are from minority groups. During the next 15 years those cohorts with progressively higher minority representation will enter the traditional college ages.
- Modifying this strong trend in ethnic mix of the young will be the effects of in-migrants, 90 percent of whom are non-minority. Most in-migrants come from California, Illinois, New York, Colorado, New Jersey, and Michigan.
- Of the 15 fastest growing job categories requiring college training, all but two require schooling in either business, engineering, health sciences, or education.
- Because we live in a dynamic state driven by a market economy, there may be rapid changes in employment conditions for special occupational groups. Therefore, flexibility in courses of study and areas of emphasis should be encouraged and facilitated.

EDUCATION AND PUBLIC EXPECTATIONS COMMITTEE

The committee identified five trends, with the indicators, related public expectations and the emerging issues for each. The trends and indicators are:

1. Heightened concern about undergraduate program quality

Declining level of preparation of entering students; push for higher standards for admission, retention, and graduation; three national reports (NIE, NEH, AAC) decry the condition of undergraduate education; major institutional efforts launched to reform the under-graduate curriculum.

2. Widespread concerns about the faculty

   An aging, tenured-in, and increasing immobile professorate; reduced faculty morale and vitality; an impending shortage of high caliber faculty and a shortage of minority faculty.

3. Concern about student access and retention

   Declining college participation and high attrition rates among some minority groups; nationally, a shrinking pool of 18 to 22-year-olds and a sharp increase in the 35 to 54 and over 65 age groups; a substantial increase in the proportion of the population made up of historically under-prepared minority groups (Blacks, Hispanics, and American Indians), including recent immigrants.

4. Increased emphasis on assessment

   Widespread use of program reviews; growth of student testing and assessment.

5. National concerns about legislative and executive groups establishing university policy

   Increased legislative and executive group intervention.

The committee also developed enrollment projections for the universities to the year 2000. The committee concluded Arizona universities enrollment may increase 46 percent (30,000 students) by 2000, with the greatest increases occurring in the years 1995-2000; the smallest increase is expected between 1985 and 1990, with a 7.9 percent increase (5,200 students). Non-resident enrollment was projected to increase 25 percent (3,996 students) by 2000. The basic projection model was the same for all Arizona universities and used Department of Economic Security growth estimates. The specific assumptions differed by campus, because often enrollments are determined by university policy and managerial actions.

GOVERNMENT, BUDGETARY AND NATURAL RESOURCE CONSIDERATIONS

Arizona's traditional conservatism is notable for strong support of higher education. Demand in per capita enrollment is high, and spending levels also rank above the national mean. The environment for the future may not be so favorable. Federal funding cutbacks shift burdens to state and local governments.

Competition for state appropriations will increase as federal support declines. There is a high degree of competition among the universities which is pursued through regional alliances in the legislature. The universities have distinct qualities, including varying stages of maturity as measured by graduate and research programs. These differences require differing responses in policy and state support.

Factors affecting the future policy environment include a dual demand pattern from the baby-boom "echo" and from adults. Much of the "echo" generation may choose community colleges as entries into higher education. Enrollments of women and ethic minorities will increase. Demand for graduate education may also increase more rapidly than undergraduate enrollments. Most major legislative accomplishments are built on cross-party coalitions, although the general conservative posture is likely to continue.

The state government will face major expenditure demands for crime and corrections, health care, water development and pollution control, transportation, and other needs of a growing state as well as education. The universities may respond to perceptions of scarce state dollars with more intense competition. An option would be a conscious alliance among the three universities to present a united front on behalf of quality higher education.

Precision in estimates of financial resources available for higher education is impossible; all key factors are volatile.

The federal funding outlook is clearly not generally optimistic, but not uniformly dark. Relatively more of both federal and corporate funds are tied to specific objectives. Gramm-Rudman will cause further immediate cutbacks; tax law changes and federal research priorities (including the fate of the "star wars" initiative) will also be critical factors. State sources provide more than half of university revenues in Arizona.

Scarcities of developable land and of water are persistent concerns of many Arizonans; these fears are not well grounded. Areas of the state most likely to grow most rapidly are shown to be sparsely developed relative to metropolitan areas of similar size, with ample land for expansion for decades to come. Water scarcity concerns arise from projections which do not include declines in present rates of agricultural water consumption (now between 80 and 90 percent of total). First generation water plans for critical water supply regions in the state demonstrate that water supplies and uses can be balanced by 2025 with reasonable conservation measures for all uses and for reductions in acreage of irrigated agriculture.

Environmental protection is critical to maintain the usability of scarce water resources; a strong groundwater protection program seems likely to emerge in the short-range future.

Amenity values are important to location of preferred industries such as new firms and corporate headquarters relocations in Arizona. Given federal floors on environmental standards, Arizona risks little in visible commitment to environmental quality, especially in groundwater quality protection. The attractiveness of Arizona's landscape is most important as a factor in quality of life for Arizona residents. The public demand for protecting and enhancing environmental values while accommodating a growing population offers opportunities for national university leadership in research and instruction with respect to arid land environments and resources.

TASK FORCE INTERVIEWS

Representatives of the Task Force staff interviewed all university vice presidents, six faculty groups, corporate and banking planning representatives, and had a group discussion with an external advisory committee and futures studies consultant. The issues raised relate to:

UNIVERSITY AFFILIATES

These comments were summarized from meetings with university vice presidents, selected Board of Regent's Associate Directors, and six faculty focus groups.

DEMOGRAPHICS

- Good probability the AZ population growth will continue. Water is not the problem once was (can shift from agriculture) but is a problem in Flagstaff.
- There is still a lot of industry wanting in to the state.
- AZ is growing, like an annex of southern CA. The environment for economy/social attitudes becoming more like Southern CA and dropping old cattle, copper, citrus, cotton.
- Maricopa county may reach its practical growth limits sooner that we think (transportation constraints, air quality); this may cause more growth in major urban areas not located in Tucson or Phoenix metropolitan areas.The 1990s will bring a dearth of students as the 1993 high school graduating class will be the smallest for years, but the growth will be rapid again by 2000.

ECONOMY

- Traditional jobs and activities vs new jobs (by 2000 probably 50% of the jobs do not have job descriptions written). So must plan for unknown in training people.
- Wild scenarios: depression/economic concerns (including COLAS for social security and deficit reduction needs).
- Some companies will not locate to AZ unless there are good schools at all levels.
- Should expect a downturn in the economy in next 3-5 yrs. Phoenix will expand again in the mid 1990s (with a significant burst of growth). Growth may be 3-4% in mid/late 1990s. We have the raw materials for this growth.
- Service and high technology economy will be the dual economies. Will have low wage and high wage, so a bimodal economy (limited "middle class"), and it is already getting to be like this. This is a strategic issues: the role of the university in a dual economy like this.
- Economic downturns may be perturbations rather than big trends, so recoveries are likely to follow downturns on within a short time.
- The economic base gets bigger so the system growth rate goes down.
- We will not see major perturbations in the job market in the near future; the service sector will continue as a major employer through the year 2000.
- Dangers signals for youth include lagging interest in high quality. There are a lot of economic incentives to quit school early.

TECHNOLOGY

- We will radically restructure knowledge. The two big ones (major revolutions) are telecommunications and biologic (biotechnology).

- Knowledge Industries are coming so universities will change profoundly as it is a natural institution for the subject.

- Revolution in biology here and coming. Like quantum mechanics in the 1920s, major changes for years and pervasive. Hard to fully comprehend the full impacts.

- Telecommunications, data, and artificial intelligence will remove the drudgery of some courses and really allow learning to take place. This will have a profound impact, equivalent to the renaissance or industrial revolution. With the dispersed population in much of Arizona this may have particular importance in the state.

- Space exploration has had an impact on the economy and on university research in the past, but these activities are likely to be flat for several years.

SOCIAL

- The United States is rapidly becoming an hispanic society, and unlike other ethnic groups before them, the hispanics will not be assimilated into the American society simply because opportunities of the past no longer exist. We need to understand this and work toward a hispanic culture and define its role.

- Universities will have different audiences (not all 18 yr old high school students or 20 yr old community college transfers coming in but come from all directions and ages). Single parents (needing day care), older women and retired people coming back. Will be lot of diversity. Long term recruitment/retention will have a lot of transition periods. This will involve different ways of teaching, living arrangements, lifestyles. Some federal mandates will cause a demand for programs or disciplines we should train for.

- Access and retention for minorities will be a major issue. The WICHE study raised profound issues.

- A lot of things will impact the personnel (students and employees) in the universities: single parents with all the special needs they have, all women in the workforce, split tasks (two half time people for one full time job), full time as 3/4 time for some.

- Future emphasis may be on transmitting information and disseminating language. Academics don't do that well and we need to integrate or translate information for now-academics.

- Higher education is becoming more important in the world - for society's research capacity and competitive needs. Society is complex and need education to understand how to participate.

- Demographics are such that minorities will be an increasing portion of the population, this will impact on "culture". How do we serve this different population, since it is different in character in than the past.

- The "yuppie" values are declining and there is more interest in social programs; this will affect university curricula.

- Structure of the work place is changing so those in mid-career can no longer move up the traditional career ladder.Society will confront a lot of new environmental issues and the university will have a large role (e.g., air and water quality, water resource management).

POLITICAL

- Future of Mexico is mixed with the uncertainties of current democracy (moving to socialist/communist) and the economy; this will cause a lot of border tensions.

- We are becoming more involved with international relations, and the resulting need for more effort in university curricula in languages, international studies, student exchange programs.

- We can be more optimistic than even five years ago that the U.S. political and economic system will not change significantly. There will be more governmental regulation as a result of recent abuses (e.g., stock market).

HIGHER EDUCATION

- Many minorities and women are overworked on committees to give "racial and sex" balance.

  What are the universities missions today? The universities need to better integrate themselves into the communities they serve. Every campus cannot do all activities well. Faculty outlooks are different as the purpose of the campus differs.

- The universities or the Regents do not have a clear vision or sense of mission that is understood by all. In developing strategic plans, the universities must remember to involve external stakeholders.

- The Arizona universities can no longer plan on a growth in budgets every year, year after year. We will have to take another look at and rethink our priorities.

- What kind of students will we see in 10-15 years.

- There will be industries trying to educate their own employees and we should cooperate not compete (use cooperative education or make special programs to teach for the industry).

- Arizona needs to put more emphasis on elementary and secondary education. University students coming out of Arizona high schools are not well prepared for college.

- Significantly higher tuition rates are coming. Capital needs - how will we meet them. In the world of computers it is expensive to renovate laboratories and provide new equipment.

- Responsibilities of bearing the cost of higher education have shifted from parent to student, with the student taking out more and more loans.

- How do we maintain access when we raise standards. Costs will move from 20% of cost of education to 25% (tuition) - we need more analysis of this.

- Employers will have to take more responsibility for educating their employees. This is especially true with current functional illiterates. The university will have to help train with additional education by new methods.

- The concept of Cooperative Extension Service is good - technology transfer and moving university results to users. The audiences have changes, however, and are not small ranchers-farmers-homemakers but small business. Universities will have to consider new audiences, in addition to on-campus students or only offering courses as a means of information transfer.

- Need to rethink how university learning is put into usable and practical information for many people.

- There are physical constraints to getting too big. But the risk of rising admission standards and enrollment caps may cause the "elite" view to suggest the universities are not for the average person.

- Where there is a perceived elitist attitude in universities and the community colleges as the only other higher education option, then you should expect high university drop out rates.

- Student retention is more important than just admission. For first generation university students (parents did not go to college) the first year is critical. If attention is not paid there, we will loose the first generation person and not gain them back.

- The curriculum will have to be overhauled more rapidly in future. Faculty will have to be more involved with the knowledge base of univ.

- Three big issues for future and universities: 1) external demands and attendant new fields, 2) subjects themselves change (like biology), and 3) information technology and tools available to disciplines.

- Dangers signals for youth include lagging interest in high quality. There are a lot of economic incentives to quit school early.

- Danger of too much academic specialization toward technology; there needs to be broad questions/approaches raised for undergraduates.

- Where will university growth stop? How many facilities can we expect to build? How big should a campus be? How many branch campuses should there be? There are differences in main campuses and branch campuses.

- To what extent do we expect to develop branch campuses like ASU West? Do we duplicate another in Tucson? Sierra Vista/Yuma, what are demands of other counties? What requirements are there for the counties to support?

- In many instances people have over-built colleges and universities, but the communities have sufficient political clout that the campus cannot be removed when no longer productive/efficient.

- We might find a revival of the "medieval university" which was mobil, moving from town to town (for rural areas).

CORPORATE AND CITIZEN AFFILIATED

These comments were developed by a meeting of the special Task Force Staff Advisory Committee and selected interviews with corporate, business, and civic leaders.

DEMOGRAPHIC

- Slower population growth rates expected for Arizona
- Increased minority involvement as a percentage of the population

ECONOMIC

- Sustainable economic development is a priority
- Internationalization and world economy/local economy linked to US
- Standard of living steady to decline in US
- Economic depression possibility; if the economy goes down, the "potential" entrepreneurs within companies may move out and start their own companies
- The movement to service economy/high technology will grow but not as fast as service; there is more in health employment than in computers and electronics
- New jobs have largely been small business/entrepreneurial (applied innovation)
- New taxes expected; energy tax, value added tax to fix Reaganomics; likely not cut education
- Arizona orientation might be: pacific rim (PAC-10 type universities), mexamerica, rocky mountains
- Multiple transformations, multiple changes underway and coming (and at different rates)
- Minorities and women will increase percentage of work force and higher skilled jobs

TECHNOLOGICAL

- Science and technology: high technology and high touch (special skills), biological, materials, information, energy, computers and robots
- Life span extension/who gets the increase/retrain folks more for multiple jobs in a career
- New knowledge systems will have major impacts on how society functions
- Robotics will have an impact on a segment of population
- Example of simple but very important impact of technology is air conditioning and Arizona.

SOCIAL

- Breakdown in morality, inadequate education, north-south gap
- Nuclearannihilation/weapons/peace

- New energy crisis likely
- Human rights revolution underway
- Values changes: attitudes-expectations-quality-feminization- expressivism-spirituality-self help are gaining in interest
- Human uncertainty: multiple options/differentiation (status, respect, power)
- Growth in knowledge with increases in technology; impacts not clear
- Mobility/decentralization of workers and others
- Long term planning becoming more necessary
- More activism at several societal groups
- Infoglut and dealing with large amounts of information
- World is getting smaller and university is recognizing it more study abroad programs
- Future of winter cities, focus on humans not structures so create new places (or refurbish old places) that people need
- New renaissance period may be coming; we can shorten time by communications, and increase breadth, but the potential for chaos is greater between the new and old, fundamental shifts on how people perceive reality; renaissance is greatest when lot of people can participate meaninglyfully in change during same period. Maybe we are getting the technological capability to do just that on a very large scale.
- The dominate need for community is still there; less for jobs and family folks but more for independent folks. There is a need for belonging, can no longer trust employer to "take care of you." Higher education might become a cornerstone of community due to its multi-functional abilities to gather people together.
- Community definition is changing, was more materialism oriented when saw others had something but the standard of living was getting less and may not be as important. People were busy on non social programs but that may be changing; more early idealism coming back toward community focused efforts (but may not be traditional community)
- Middle age folks raised in 60s have not lost idealism now kids are gone and career is satisfactory so can do something for others
- High or well paid executives are in middle age (40-50's), but the coming executives (30-40's have more people to compete with and less opportunity to move into historic positions (downsizing management); this may cause conflicts and pressures.
- Must cooperate more and be less competitive, conflict resolution needs better understanding. Again, competition vs community is an issue.
- Computer standards might be models for cooperative/competitive activities. If you don't have some "common" standard everyone has too little market to survive, but a few

standards allows group efforts but with individual contributions.

- Need cultural diversity in Arizona. The Native Americans and Hispanics will become more important over time.
- Lot of prison construction/crime in AZ. Why is this?
- Experts can look at issues through their narrow focus, but need mechanisms to have things come together for better understanding.
- Can begin to identify new fields by futures oriented looking. A recent example might be cognitive science (linguistics, neuroscience, physiology)
- Need incentives to look long term, universities are like corporations and look short term
- Involvement of people and greater support for them will be more likely in businesses in the future
- Need for increased flexibility in benefits, working conditions for employees (e.g., non-financial rewards)
- Workers wish more autonomy, participatory decision making, communication and feedback, involvement in the institutional culture and sense of belonging
- Acts of god and man must be considered in future scenarios
- Lot of information exchanged informally through networks; we need to keep this in mind.
- Certain ideas currently in power: excellence, competitiveness (e.g., ideas held by those in power)
- A big problem for society is the number of high school drop outs. If they cannot read then we are in trouble and there will be significant social costs to all.

POLITICAL

- Networking and participatory democracy are increasing in interest
- Increases in terrorism (including chemical and biological weapons)
- With new information technologies one can achieve global interactions without leaving the homebase
- Increase in regulations: pollution control, waste management, traffic movement, medicine and drugs/substance abuse.
- Revival of peace corps/vista, national voluntary services.
- Learn to deal with macro emergency responses (e.g., major FL hurricanes, CA earthquakes)
- We should plan for a major disaster; most universities shy away from this in their planning activities.
- Some hopes: better Soviet/US relations, corporate renewal, biotechnology, information technology, new thinking
- Some fears: economic collapse, environment, nuclear weapons, AIDS, third energy crisis

HEALTH AND ENVIRONMENT

- Overpopulation, environmental degradation, natural resources/baby boom, migration, north/south, sunbelt/south
- Critical environmental needs/ population needs, waste disposal, climate warming, water quality

HIGHER EDUCATION

- Universities should look at what areas are not being done (e.g, follow-ups on biotechnology and its impacts on other disciplines)
- Need to educate for "corporate" entrepreneurs. Most business school case studies are based on large or medium corporations but that is not where the action is today
- Why do me keep producing more MBA's when we need fewer middle managers (is it simply due to student demand? Do we just need a new definition of the MBA?)
- Implications for higher education: more learning styles possible by choice, more electives, new communication patterns, new degree types
- We should foster integrative thinking
- We should exploit southwest futures
- Work/education at home: discussion on new communication patterns was a lot of wishful thinking by Alvin Toffler. But, we need community; teaching at distance has lot of potential but remember not all people will be working at home.
- Mexico is close, we should consider many more interactions with Mexico than just on economic issues
- More futures research is needed about things that could happen; the times are uncertain and we need to keep our eyes open.
- We will get educational competition from other states if don't do something on telecommunication and educations. State borders are non-existent with satellites.
- Changing jobs and technology shifts will require continued training of the workforce
- Why is the University of Phoenix a competitor? They are aggressive, give what the customers want in the way of an education, and they are flexible; universities are too rigid (both in accommodating students and providing offerings).
- Universities are not generally environmentally sensitive and cannot respond rapidly to change; sometimes this is good and sometimes it is bad.
- The universities need to have a few areas of excellence not a ton
- UA/ASU want international/national research reputation; NAU and Grand Canyon college teaching. Not sure this is bad.
- What is good for society ? Are the univ addressing the right areas? What are the right areas? What should a modern university be doing for society?

- Are policy and technical oriented political think tanks replacing universities in providing intellectual debates? Probably yes, the think tanks fill vacuum; universities base their rewards by discipline and problems are interdisciplinary). Universities need to make a place for horizontal understanding not just vertical investigation.

DEMOGRAPHIC CHANGES

The United States population is undergoing a dramatic change as the "baby boom" children move into the middle age brackets and their children (echo) become college-age in the next decade (Figure 2). These shifts account for a declining 18-year old population during the next few years and the resurgence in the next decade, the increase in post 65-year olds, and the significant shifts in the mid years.

INTERSTATE MOBILITY 1975-1980[32]

The age distribution and the migration rate is an important variable for Arizona population estimates. Table 1 indicates the age distribution and greatest mobility.

Table 1. Age-Specific Mobility of U.S. Population*

Age Group	Population	Interstate Movers	Migration Rate
5-19 Years	16,575	1,857	112
10-14	18,181	1,588	87
15-19	21,020	1,951	93
20-24	21,208	3,282	155
25-29	19,516	3,308	170
30-34	17,705	2,439	138
35-39	13,944	1,508	108
40-44	11,626	951	82
45-49	11,053	683	62
50-54	11,741	583	50

*US Bureau of Census, Population in 1000, Rate in movers/1000 population

The age groups from 20-34 represent the highest migration years. The largest percentage of the population in those age brackets occurred in the 1970-80 timeframe, with some trailing 5 years on either side (Table 2); thus, migration estimates developed during this high period are unlikely to prevail over the next decade or so.

Table 2. Changes in Age Composition of U.S Population 1965-1985*

Age Group	1965-70	1970-75	1977-80	1980-85
Under 5	-13.4	-6.1	2.1	9.5
5-9	- 2.3	-11.7	-5.6	1.3
10-14	9.5	- 1.0	-11.6	-6.2
15-19	13.6	10.4	- 0.6	-12.1
20-24	23.7	16.5	10.7	- 1.8
25-29	21.2	26.3	14.6	10.5
30-34	4.2	22.8	25.6	14.2
35-39	- 7.3	4.6	21.5	25.8
40-44	- 3.5	- 6.6	4.9	19.9
45-49	6.8	- 3.0	-6.2	5.4

*U.S. Census Bureau, numbers in percent.

HIGH SCHOOL GRADUATION RATES (WICHE) 1986-2004

The Western Interstate Commission on Higher Education recently updated their Projections of High School Graduates to the year 2004.[33] The future trends in high school graduation will dip in the 1989-1994 period and increase beyond 1994.

However, the growth rates will differ markedly by state. For the period 1986 to 1992, the only states with a positive growth rate are Alaska, Arizona, Nevada, Utah, Florida, Georgia, Tennessee, and Texas. States with a negative growth rate from 1986 to 2004 include Illinois, Indiana, Iowa, Ohio, Wisconsin, Idaho, Montana, Oregon, and Wyoming.

While high school graduation rates are not predictors of university enrollments, that age group currently accounts for over 85 percent of the enrollment in the

Arizona universities. Future enrollment changes can be dramatic, depending on how the universities react to these demographic changes, the number of part time students, the admission standards, and the economy. The comparison of Arizona to United States projected graduates is shown in Figure 3, at the end of this section.

ARIZONA ENVIRONMENTAL SCAN[34]

The following summary is taken from Bartram and Gebel, Arizona Environmental Scan Study.

I. DEMOGRAPHIC CHANGES

- Year 2000 Arizona population estimates vary from 4.618 million (US BEA) to 5.321 million (AZ DES), a difference of 703,000 over the next 12 years. The DES year 2010 estimate is 6.686 million and the BEA estimate is 5.319 million, a difference of 1.367 million over the next 22 years. The 1987 population was 3.480 million. The DES number is generally acknowledged to be high, and the BEA is using a revised method involving interstate migration rate data.

- Changes in population age groups are due to 1) the baby boom moving into the middle years, 2) increased longevity, and 3) increased young as a baby boom echo. Peaks occur in the 0-4, 24-39, and 64-74 age groups. The age distribution of Arizona is very similar to that of the United States, with slightly higher numbers of children less than 14 and persons over 65.

- Net migration to Arizona is the primary cause of growth but there is a large out migration rate as well as the large in migration rate. During the five-year period 1980 to 1985, in-migration averaged 161,200 and out-migration averaged 116,380, for a net growth of 44,820. The ration of in- to out-migration is about 4 to 3. In-migration is related to the economy and has ranged from less than 40,000 to over 90,000 in the last 15 years. In-migrants are more likely to be young adults, with income, more education, and white.

- The top migration flows for Arizona (and whether the net flow to Arizona is increasing or decreasing over last 5 years) are: CA (in-flow decreasing), NM (out-flow about same), TX (out-flow becomes in-flow), WA (in-flow increasing), IL (in-flow increasing), OH (in-flow leveling), MI, in-flow decreasing), NY in-flow decreasing).

- The greatest growth areas in Arizona are the Phoenix metropolitan followed by the Tucson metropolitan area. The areas of greatest growth (in people not rate) of the Phoenix area is Southeast, followed by Northwest.

- The Hispanic component of Arizona's population is significantly higher for those aged 24 or less, and significantly lower for ages 60 and older. While Spanish origin people are 16 percent of the overall population, they have 26 percent of the children under age 4. The distribution is similar for American Indian, with 5.3 percent of the state population and 8.5 percent of the children under age 4. The greatest number of young are found in the rural counties (other than Maricopa and Pima).

- Arizona's population has a higher than national average education but lower than the populous western states (CA, CO, OR, UT, WA). Those ethnic groups which are substantially lower in high school graduates are American Indians and Hispanics, with Blacks intermediate.

- Part-time workers cause employment in some services to appear higher than appropriate when compared with other industries.

II. ECONOMIC CHANGES

- The greatest employment industries (1984) are general services - excluding business and health - (10.2 percent), retail trade -excluding food related - (9.1 percent), construction (7.7 percent), business and repair services (7.4), government - excluding military and schools - (7.2 percent), manufacturing - excluding high technology - (7.2 percent), state and local schools (6.6 percent), Retail trade/eating (6.0 percent), tourism (5.5 percent), health services (5.2 percent), manufacturing - high technology - (5.0 percent), and banking/finance/insurance (4.4 percent)

- Occupational employment in Arizona is production (26 percent), professional (19.5 percent), clerical (18.5 percent), service (17.3 percent), sales (11.7 percent), managerial (6.2 percent), and agricultural (0.8 percent). Maricopa County has 60-70 percent of jobs in all categories except agriculture (57 percent).

- Arizona has a greater percentage of workers than the US average in the following areas: service, government, retail trade, construction, and finance,insurance and real estate and mining. It has less than the US average for manufacturing, wholesale trade, transportation, communications, and public utilities, and agriculture. Increases are expected to be in the 70-90 percent range from 1983 to 2000 except for government, agriculture, and mining.

III. PUBLIC SCHOOL EDUCATION

- Ethnic data are not available for the graduating high school class, but an estimate (by 12th grade class) indicates the proportion of minorities is about a third (ranging from 28 to 38 percent) of the total population in each grades; this is greater in the rural counties. Most of that is Hispanic, with a greater proportion in the early grades. Hispanic and American Indian students have the greatest dropout rate of all minorities (most are stable in their degree of dropout rate). The Black and Asian drop-rate is less than for whites (9th grade to graduation comparison).

- High school graduation projections are important for determining university enrollments, but are difficult to estimate. Growth is likely to continue in numbers of high school graduates through Fall 1989, then drop slightly/level off until about 1995, when the number begins to grow rapidly.

- Arizona ACT scores are slightly higher than the national average and Arizona SAT scores are slightly lower than the national average.

- College preferences (ACT data source) of Arizona high school graduates of the first through sixth choice are ASU, UA, followed by

NAU, then a large drop to Mesa, Glendale, Brigham Young, Phoenix, Pima, Grand Canyon, Military Academies, Scottsdale, UCLA, Stanford, San Diego State University.

IV. HIGHER EDUCATION

- Arizona has 94 percent of its higher education enrollment in public institutions compared to 78 percent nationally. This is higher than any other urban western state.
- Arizona has 46 percent of its college students full time compared to 58 percent nationally.
- Arizona relies more heavily on community colleges (46 percent of FTE enrollments) than the national average (38 percent).
- Arizona higher education enrollment in fall 1986 - was 57.6 percent community college, 38.8 percent state universities, 3.4 percent private colleges, and 0.2 percent bible colleges.
- In the 5-year period 1981 to 1986 the state population increased 19 percent and the higher education (community college and university) FTE enrollment grew 2.3 percent
- In the 10-year period 1976 to 1986, FTE enrollment for Arizona universities was relatively constant, varying between 61,608 and 68,055 (two years had declines); from 1980 to 1985 there was actually a decline from 66,417 to 66,172.
- In the 10-year period 1976 to 1986, headcount enrollment for Arizona universities gradually increased from 73,426 to 85,827; in the last five years (1981 to 1986) it grew more slowly from 81,465 to 85,827.
- In the 10-year period 1976 to 1986, the FTE enrollment of Arizona universities per Arizona population was a gradual and steady decline from 48 per 1000 to 36 per 1000
- In the 1980 census, 20 percent of the high school graduates in the 18-24 age group were minorities. In the community colleges, 20 percent of the enrollments were minority, and in the universities, 11-14 percent of the enrollments were minority.
- The states where Arizona high school students (over 100 each for all students categories Fall 1984) attend colleges are California, Kansas, Texas, Utah, New Mexico, Colorado, Florida, New York, Idaho, Missouri.
- The states from which Arizona colleges and universities receive students (over 300 of all student categories Fall 1984) are California, Illinois, Colorado, New Mexico, New York, Michigan (the sequence is the same for new freshmen as well as total students).
- The residencies of new students (over 100) enrolled in Fall, 1984 at selected Arizona universities are ASU (California, Illinois, Colorado, New York, Michigan, Minnesota, Wisconsin, Washington, Ohio, Oregon, Texas), NAU (California), UA (California, Illinois, New York, Colorado).
- ASU gets 53 percent of transfers from community colleges and between the universities, UA gets 26 percent, and NAU gets 20 percent;

ASU gets more community college transfers from Arizona (1991) that it gets in new Arizona freshmen (1958) for (Fall 1987)

- More than 84 percent of ASU undergraduate students are full time and 82 percent of all full time undergraduates are in between 18 and 24 in Fall, 1987.
- The Fall, 1987 headcount undergraduate on-campus students at NAU in the 18-24 age bracket are 78 percent of on-campus enrollment. On-campus enrollment accounts for 85 percent or total enrollment, or 97 percent of undergraduate and 45 percent of graduate. The off-campus enrollment is essentially all graduates, and is primarily adults beyond age 25.

- For academic year 1985-86 the fields of largest study (credit hours) at ASU were Social Science, Business and Public Policy, Engineering, Education, and Visual/Performing Arts.

- For academic year 1985-86 the fields of largest study (credit hours) at UA were Social Science, Letters, Physical Science, Engineering, and Business and Public Policy.

- For academic year 1985-86 the fields of largest study (credit hours) at NAU were Social Science, Education, Letters, Business and Public Policy, and Mathematics.

- Comparing number of bachelor degrees awarded in Arizona universities per 1000 undergraduate enrollment by ethnicity (FY 86), the least awards were to American Indians followed by Blacks. Hispanics were near Asians and Whites were the highest (the figures vary by university).

- Bachelor degrees for FY 86 at Arizona universities (comprising 50 percent of all degrees) were business and management (over twice the next entry), education, engineering, and communications. Masters degrees are education (over twice the next entry), business and management, and engineering. Doctoral degrees are education (twice the next entry), physical sciences, and life sciences.

- Research funding expenditures as reported by the National Science Foundation indicate (FY 85) that Arizona is higher in physical sciences, environmental sciences, and social sciences, and less in life sciences, computer sciences, mathematics, and psychology than the national average (note that Education funds are not included in this analysis).

ADDITIONAL FIGURES

1987 Freshman Survey Data

FIGURE 1

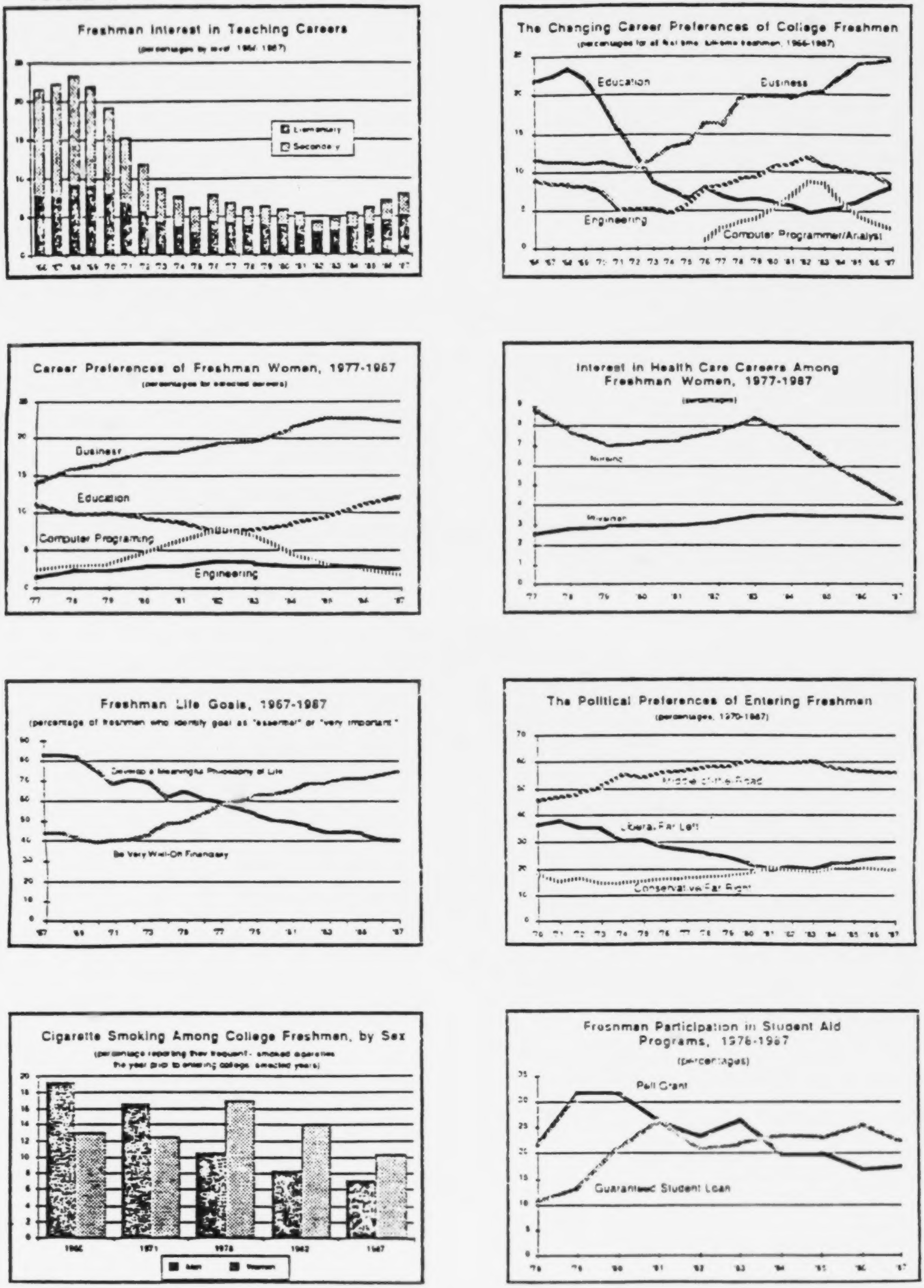
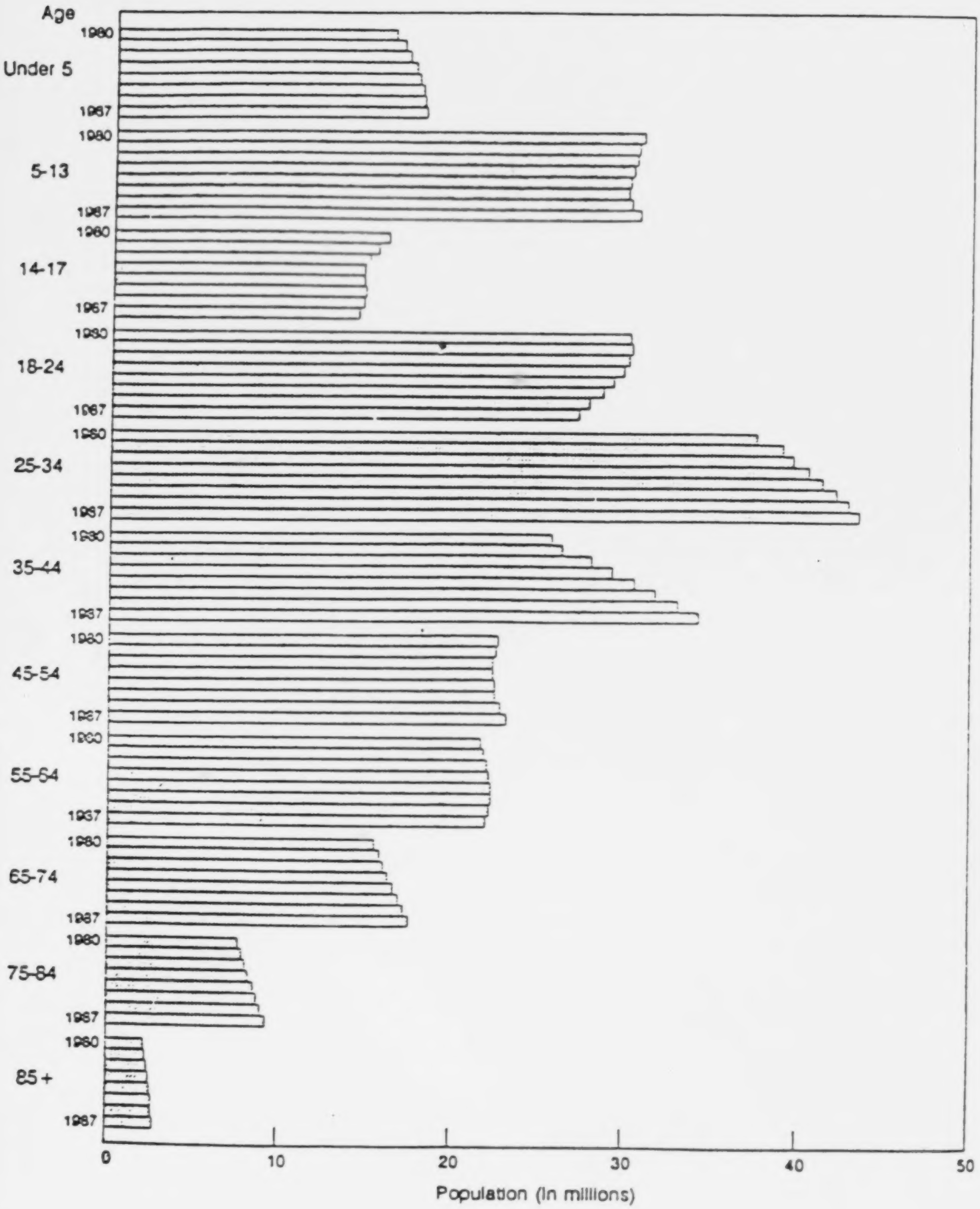


Figure 3.
Total Population Including Armed Forces Overseas, by Age: July 1, 1980-87



END NOTES

1. These driving forces are summarized from more detailed trends and forecasts identified in Part I and Part II of this paper.

2. For a more detailed review of possible impacts of biotechnology, see Biotechnology: Strategies for Life, Elizabeth Antebi and David Fishlock, MIT Press, Cambridge, MA, 1986; and Science Magazine, 10 June 1988, V240: 1377-1580, Frontiers in Biotechnology.

3. See Ritchie, David. 1988. Superquake! Why Earthquakes Occur and When the Big One Will Hit Southern California, Crown Publishers, 185 p; and California's Quakes Forecasted, Science Magazine, 22 July 1988, 413-414.

4. For a more detailed description of the issues relating to a earthquake see U.S. Geological Survey ....

5. For further discussion see Peter Peterson, The Morning After, in Atlantic Monthly, October 1987, 43-69; and Lester Thurow and Laura D'Andrea Tyson, The Economic Black Hole, in Foreign Policy, Summer 1987, 3-21.

6. See Jorge Castaneda. 1986. "Mexico's Coming Challenges." Foreign Policy, Fall 1886 p 120-139; and Thomas Merrick. 1986. "Population Pressures in Latin America." Population Bulletin, July 1986 p 1-51; and Benjamin Orlove, Michael Foley and Thomas Love. 1988. "State, Capital, and Rural Society: Anthropological Perspectives on Political Economy in Mexico and the Andes", Westview Press, Boulder, Colorado, 320 p.

7. For further information see: Chernobyl: The End of Nuclear Power?, Special Issue, The Ecologist 16:4/5, 137-221, 1986; and The Renewable Energy Alternative: How the United States and the World can Prosper Without Nuclear Energy or Coal, John Blackburn, Duke University Press, 1987; and Impending United States Energy Crisis, Robert Hisrch, Science, 20 March 1987, 1467-1472.

8. For further information see: The Next Arab Decade: Alternative Futures, by Hisham Sharabi, Westview Press, Boulder, Colorado, 1988; and Toward Arab-Israeli Peace: Report of a Study Group, Brookings Institution, Washington, 1988.

9. For further information see: Space 2000: Meeting the Challenge of a New Era, by Harry Shipman, Plenum Press, 1987; Space Resources: Breaking the Bounds of Earth, by John R. Lewis and Ruth A. Lewis, Columbia University Press.

10. For further information see: Societal Responses to Regional Climatic Change: Forecasting by Analogy, by Michael H. Glantz, National Center for Atmospheric Research, Westview Press, Boulder, CO, 1988.

225

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11. For further information see: Terrorism and Global Security: The Nuclear Threat, by Louis Rene Beres, Westview Press, Boulder, CO, 1987; and Spies, Terrorists, and US Border, by John Dillon, The Christian Science Monitor, 24 March 1986, page 1; and America the Vulnerable: The Threat of Chemical and Biological Warfare, by Joseph Douglass Jr, and Neil Livingstone, Lexington Books, Lexington, MA, 1987.

12. A more detailed description of the Arizona universities is in the working paper "Arizona Universities in Transition".

13. Percentage of degrees for those disciplines comprising 40 percent or more of total degrees in each category. Arizona universities' total percentage in two-year period FY 87 and FY 88; national average for FY 84. Categories defined by Higher Education General Index.

14. These recommendations are also found in the Working Paper titled "Foresight: Definition and Need for Arizona Universities."

15. An overview of report was made available in April 1988 with the title "Some Thoughts About Approaching the Future of Arizona", 5 p.

16. Published by the World Future Society and edited by Michael Marien. Used with permission.

17. United Way of America. 1987. What Lies Ahead: Looking Toward the '90s." 86 p.

18. Cetron, Marvin J., Wanda Rocha, and Rebecca Luckins. 1988. Into the 21st Century: Long-Term Trends Affecting the United States. The Futurist XXII(4) 29:40.

19. The 16 states are Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

20. Western Interstate Commission for Higher Education, 1987 From Minority to Majority: Education and the Future of the Southwest." Boulder, Colorado. 38 p.

21. Arizona Department of Economic Security. 1986. Hispanics in Transition. 22 p.

22. See Working Paper "Executive Summaries of Reports and Books on Higher Education."

23. Michael, Don. 1985. New Competence: Management Skills for the Future; Drucker, Peter F. 1988. The Coming of the New Organization. Harvard Business Review 80: 45-53.

24. The Arizona Academy and the Arizona universities have a unique relationship, in which the universities prepare research reports for Academy identified societal concerns. The universities might take particular advantage of the subsequent Academy recommendations in forming the universities' planning activities.

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25. Urban Growth in Arizona: A Policy Analysis was developed by the Morrison Institute for Public Policy at ASU for the Joint Interim Committee on Urban Growth Issues of the Arizona Legislature. Copies are available from the office of Senator John T. Mawhinney, Co-chair of the Joint Committee.

26. Additional indicators of public interest in the Future include: The "Arizona Looks to the Future" conference (sponsored by 27 businesses and non-profit groups but was focused on Southern Arizona in September 1987), and a 1987 commissioned study by Neal Peirce for the Arizona Republic and Phoenix Gazette (Urban Challenges: A Vision for the Future).

27. This 1987-88 study expanded a similar study undertaken by Arizona State University. The authors are Jack Bartram and Melenda Gebel.

28. Arizona: The State and Its Educational System, Harold L. Hodgkinson, Institute for Educational Leadership, Washington, D.C. April 1988, 14 p.

29. The CIRP study is under the direction of Professor Alexander Astin at the University of California, Los Angeles. The current survey results are available as "The American Freshman: National Norms for Fall 1987, Cooperative Institutional Research Program, UCLA, and American Council on Education. 165 p.

30. See, for example, Chronicle of Higher Education, "Today's Students Flock to Courses About 1960s," May 25, 1988, p A33; and Paul Taylor, "The Coming of the "We" Decade", The Washington Post, Sunday, 20 July 1986, D1.

31. These three reports are summarized using much of the original wording but are not verbatim statements of the original reports.

32. Developed by Professor David Plane, Department of Geography and Regional Development, University of Arizona, 1988.

33. Western Interstate Commission for Higher Education "High School Graduates: Projections by State, 1986 to 2004." The Arizona projections should be considered as probable high estimates because the data source is taken directly from the Department of Economic Security projections and does not compensate for anticipated lowered migration rates due to demographic shifts in age groups. Published March 1988 and available from WICHE, Denver, Colorado.

34. Jack Bartram and Melinda Gebel "Arizona Environmental Scan" prepared for Task Force, 1988.

STRATEGIC PLANNING AND THE ARIZONA UNIVERSITIES

ROGER L. CALDWELL

PART I.

DESCRIPTION AND RECOMMENDATIONS

PURPOSE

This paper will focus on the formal and documented activities that could be described as leading to strategic choices and implementation efforts in the Arizona universities. It will also discuss the strategic planning literature in an effort to compare the Arizona process to that of other universities. A brief review of the changing activities of the universities is listed to place the need for change in perspective. Any references to specific university planning activities are used as examples of current operations as the strategic planning process is actively underway.[1]

DEFINITIONS

The term "strategic planning" has come to mean different things to different people. It is an important concept and is worth providing a range of definitions to better understand the most appropriate interpretation of the term by the Arizona universities. This report will include several such definitions, but basically the strategic planning concept concentrates on changes in the external environment, identifies university strengths and weaknesses, and then catalogs the few areas where selected programs are required or focused excellence can be attained. It is especially helpful when the environment is changing and uncertain and when anticipated resources are constrained; these conditions currently exist.

The Arizona universities have begun a process, but there are substantial differences in the methods among the universities and between the universities and the Board of Regents' staff. The overall planning process has lacked clarity for several years. While it is obvious that all Arizona universities have a "plan" for moving in a certain direction, the actual plans vary widely in approach, content, and degree to which the results are communicated to others.

There are several approaches one could take to effect a strategic planning process; the most appropriate choice depends on factors such as the internal operations of the universities and the ABOR staff, the external environment (e.g., local, state, national, international), the visions and current projects of the universities and the ABOR, and the purpose of the plan. The strategic

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planning process can also serve to make universities distinguished. Newman (1987) has listed a series of items that "make a university great"; the essentials of strategic planning (or just "good management") occur numerous times in such a listing.

CHANGING TIMES

The Arizona universities have changed significantly in the relatively recent past.[2] The changes taking place in society (especially the demographic, economic, and technological trends) will create uncertainty for a long period (perhaps a decade), requiring that target directions be understood and chosen to maintain efficient and effective university programs.[3] Strategic planning is the vehicle to address these changes and opportunities.

The timing for such a planning process is excellent, with the maturing of the Arizona universities and the anticipated changes in the external environment occurring about the same time. The demographic trends are causing a national decrease in the traditional college-age population for the next six or so years. The economic trends are mixed but suggest past trends will not be continued as the national debt is reduced and the major shifts occur among the various sectors of the economy. It is also timely due to current interest by the universities and the Board of Regents (this is representative of a growing interest in this type of planning in the higher education community).

The three Arizona universities are somewhat atypical of the average public university in the United States even though we are in a state with average population (ranked 25 nationally). For example, the number of universities for our population level is relatively small and are essentially all publicly funded,[4] the rate of growth of all three universities has been quite rapid. However, the growth rates have not been the same for all universities (Table 1). For example, during the 15 year period 1970 to 1985, ASU and NAU grew about three times as fast as the UA in both student credit hours taken and headcount enrollment, but headcount enrollment grew significantly more rapidly than the credits taken, indicating the part time nature of a major part of the increases. This is an important issue, as allocation of resources directed at growth has a different effect than those directed at program development. The three Arizona universities are also different from one another in historic activities, program structure and focus, rate of growth and development (and related types of resource demands), and disciplines of major focus.

Table 1. Growth Rates of Arizona Universities 1970-1985

University	Unit	15-Year Growth	Average Annual Growth
ASU	SCH	34.0%	2.3%
	HC	53.5%	3.6%
NAU	SCH	30.4%	2.0%
	HC	54.6%	3.6%
UA	SCH	11.6%	0.8%
	HC	17.6%	1.2%

SCH = Student Credit Hours; HC = headcount enrollment

Changes in the non-university environment will have large effects on the universities[5]. The major driving forces in the external environment include:

- The increasingly international scope of our economic, political, and social processes and the role of the universities in economic development and competitiveness of the state will impact on the curriculum and the external relations of the universities.

- Changing mix of types of students and their reasons for attaining higher education (and the techniques of receiving that education); this will involve changes in initial access opportunities as well as after enrollment retention efforts and continuing education opportunities.

- Uncertain economic future related to national and international debt, increased internationalization of the economy, and shifts from traditional industries to small business orientation.
- Shifts in political attitudes and social values, increased need for greater affirmative action towards the minorities represented in Arizona, in both the workplace and the educational system.
- Increased interest in assessment of the products of the educational systems and the competive nature of new "knowledge industries" against the traditional university.
- Increasing gap between types of available jobs and types of college training, between college demanding jobs and low ability jobs, and job opportunities for young and old alike. Technological changes and their impacts brought about by the information industries, materials sciences, and biological revolution will be difficult to predict but substantial.
- Job growth requiring higher education is expected in fields requiring training in business, engineering, health sciences, or education, but substantial job growth will also occur in low skills areas as well.

To successfully navigate the future, we will to increase our use of several skills, including:

- Understanding the need and developing additional means to operate under conditions of uncertainty and flexibility,
- Improving our ability to anticipate the unanticipated and to be prepared for sudden changes in the familiar,
- Developing our capability to understand multiple effects of seemingly simple decisions or events and consideration of the positive and negative effects of change on the institution and society, and
- Finding and accessing relevant information from among the vast amount of data.

These techniques could be incorporated under the process of strategic planning that realistically addresses the changes taking place in the external environment.

STRATEGIC PLANNING ISSUES

RATIONALE

Strategic planning concentrates on external trends and identifies the several areas where the particular strengths of an institution most closely match future demands. By necessity, this approach precludes being "all things to all people;" it therefore requires substantial and realistic analysis of external and internal conditions and communication to all concerned parties. It could appropriately be described as the process that will lead to "focused excellence" within the individual universities, but it must also provide for those activities that need to be "quality" (assuming that "poor" activities are either eliminated or improved). The determination of these focal areas is one of the purposes of strategic planning. The process of focusing on a few areas is not simple and difficult decisions are required before the plan can be implemented.

One conclusion the Arizona universities might find is that all their programs will be "good" and a few will be truly excellent. This will necessitate resources to be directed at both categories.

Every institution or organization does some type of planning. It might be as simple as preparing a budget with involvement of only a few people, or it might be a highly structured process involving many people. Formats of a strategic plan could also range from a single page listing of strategic directions to a multi-page document that includes specific goals and objectives for attaining the strategic choices.

The term "strategic planning" is probably overused, and is often incorrectly equated with "long range planning." The two are considerably different in concept, development, and results (Table 2). Long range planning tends to be trend oriented (plus or minus a small amount for uncertainty) and constrains movement into new areas.

Table 2. Differences in Long Range Planning and Strategic Planning*

Long range planning	Strategic Planning
Tradition oriented	Mission oriented
Small changes from past	Dynamic and change oriented
Influenced by budget/governance	Open and participatory
Blueprint of future	Vision of future
Objective data emphasized	Subjective/intuitive data emphasized
Inaction when ambiguous	Proactive even with uncertainty
Internal focus	External focus
Efficiency oriented	Focus on doing the right thing
Planning office develops	Institution-wide development
Relies on tested actions	Opportunity analysis driven
Reactive	Proactive

* Meredith et al. (1987)

Strategic planning offers some special advantages by identifying internal strengths and weaknesses, external opportunities and threats, and finding those areas of overlap to determine a selected few special directions for special institutional guidance. If done skillfully, strategic planning can provide the rationale for difficult decision making; some examples of such choices are listed in Table 3. While it is clear that some programs may not constitute particular strengths or weaknesses, or there may not be special external opportunities, these too need to be in the overall strategic plan.

Table 3. Examples of Decisions Aided by Existence of a Strategic Plan*

. Emphasis on teaching and research (graduate education vs contracts)
. Emphasis on existing strong programs vs needed but weak programs
. Program reviews (academic departments) and new or existing majors
. Necessary vs unnecessary duplicative programs among the universities
. Emphasis on student recruitment vs retention of current students
. Focus on programs of local vs national vs international significance
. Attention to minority concerns vs management for average population
. Anticipation of new majors and decline of other majors
. Determine if a new activity will add or subtract from vitality
. Justification of allocation of funds among competing demands

* Meredith et al. (1987)

Perhaps strategic planning can be distinguished further by listing two definitions. Cope, (1986) provides the following definition:

"Strategic Planning, a relatively new management tool, is not simply an aggregation of budgets or a collection of management techniques to address all the issues facing an institution. Strategic planning is an open systems approach to steering an enterprise over time through uncertain environmental waters.

It is a proactive problem solving behavior directed externally at conditions in the environment. It is a means to find a favorable comparative position in an industry where there is continual competition for resources. The primary purpose is to link the institution's future to anticipated changes in the environment in such a way that the depletion of resources (money, personnel, students, goodwill..) is slower than the acquisition of new resources.

Keller (1983) offers the following features of strategic planning that distinguish it from other types of planning or management:

1. Academic strategic decision making means that a college, school, or university and its leaders are active rather than passive about their position in history.

2. Strategic planning looks outward and is focused on keeping the institution in step with the changing environment.

3. Academic strategy making is competitive, recognizing that higher education is subject to economic market conditions and to increasingly strong competition.

4. Strategic planning concentrates on decisions, not documented plans, analyses, forecasts, and goals.

5. Strategy making is a blend of rational and economic analysis, political maneuvering, and psychological interplay. It is therefore participatory and highly tolerant of controversy.

6. Strategic planning concentrates on the fate of the institution above everything else. [Note: Keller is making reference to individual institutional plans rather than several institutions under one governing board].

To further define the term, Keller has developed a listing of what strategic planning is not (see "Shaping an Academic Strategy: Examples of Non-planning" in the Background section). A number of universities are engaged in strategic planning activities, with perhaps two dozen really addressing fundamental issues in the true strategic sense. Some have implemented changes as a result.

Selected examples of their approaches are listed in the Background section "Description of Selected Planning Processes for Other Universities."

IMPLEMENTATION

There is no single best approach to strategic planning, and some discussion is required to determine which methods are most appropriate for Arizona. For any process, however, several elements are essential in the planning process. These are:

1. State all assumptions for the planning time frame; confirm the assumptions are reasonable and not mutually contradictory.

2. Involve the principal stakeholders (see Table 4 for examples).

3. Include an appropriate number of employees in the process. These may be principally managers and faculty, but the communication involved in developing the strategic planning factors will better insure that the plan is realistic AND that it will be implemented because those involved in the process will be implementing it.

4. Educate those involved in the process by stating the rationale of the planning exercise and providing workshops in how to develop strategic planning documents. The process is sufficiently new, the meaning is so varied, and the need for communication of options and airing of assumptions so great that this educational element becomes essential to an effective plan.

5. Allow for formulating alternative courses of action, sometimes on short notice, and planning options for uncertainty or seemingly unlikely events.

6. Cause the setting of attainable goals and measurable objectives and the development of monitoring or evaluation mechanisms to track progress.

7. Provide feedback of results to those participating in the process.

The important message is that the process uses realistic assumptions and relevant data, involves a number of people, and develops strategies which are practical given the resources and time frame of the planning effort. See "Content of Typical Strategic Planning Processes" in the Background section for further examples.

Table 4. Examples of Stakeholders Who Might Participate in Planning

Students, faculty, professionals
Administration, staff
Alumni and parents
Arizona business, industry, and citizens
State and local government officials
Funding agencies and professional associations

There are also some agreed upon important criteria for success in a planning process. These are:

1. The process must be endorsed by the senior administration, with no competing processes used for planning and actions;

2. The plan must be used for decision making once it is formalized, and a clear link must exist to the resource allocation and evaluation processes; and

3. The process must be clearly communicated to all relevant parties, particularly to the faculty, and appropriate means for feedback developed for revision of the process or the plan content.

Further, the implementation process must be efficient of people's time and not be perceived as one more report writing exercise.

The choice of a process depends on the purpose of the planning operation. If it is to verify that actions are taken and that the linked programs are evaluated, then a more structured approach is appropriate. If it is for strategic guidance overview and monitoring of results, then a less structured approach is appropriate. While it depends on the institutional situation, it is likely there will be more than one strategic plan. For example, three versions seem plausible:

1. a general document for wide distribution to constituents and clients that provides appropriate background and the few strategic directions;

2. a more detailed document, with supporting documentation, for distribution within the administrative structure of the institution; and

3. a detailed resource allocation design to accomplish the directions raised in the plan (this is an administrative activity and should not be attempted by any planning committees).

While the essential content of the plan would exist in each version, they would differ in the detail and presentation format for the various intended audiences.

Since the mission statement is of primary importance in communicating the overall strategies to employees and others, its content and format are fundamental to an effective plan. See the Background section "Mission Statement Guidelines" for examples of mission statement components.

ARIZONA UNIVERSITIES' PLANNING ACTIVITIES

BACKGROUND

The most recent formal Long Range Plan was adopted by the Board of Regents in April 1974 ("University Development in the Mid-Seventies: A Long Range Plan").

This 37-page document included board policies relating to enrollment, capital planning, responsibilities of the universities, continuing education, undergraduate and graduate education, research, public service, space use, and physical facilities planning. It also included a listing by college of each university academic plans.

Until 1980, the formal long range planning activities for the universities (collectively through the Board of Regents' office) consisted of academic program approvals, and budget related decisions primarily made on an ad hoc basis. At that time, the first mission and scope statement for each individual university was completed (July, 1980).

This process took three years and was coordinated by the ABOR staff, which provided a set of planning assumptions and general criteria. A substantial amount of useful planning-related information was developed during this process. There was a considerable amount of effort expended by the three universities and the ABOR staff in defining these 1980 mission statements (including the development of goals, priorities, and some institutional profile information).

As the 1984 annual change process for mission statement revisions began, the circumstances changed, with the result that the currently approved mission statements remain the 1983 version. The events included: a substantial process change to include new format and content which was delayed by a Budget Cost Study; the establishment of a new ABOR staff directorate for strategic planning in 1987; a state mandate for a five-year capital plan submission was effected in 1988; and the establishment of this Task Force on Excellence, Efficiency and Competitiveness.

In reviewing the history of planning over the last decade, several planning related points surface:

- There is a good deal of appropriate concern (by both the ABOR staff and the universities) about "duplication" of efforts and the need for different mission statements among the universities. However, some new proposals involve an evaluation process that causes delays for comments by members of each university and the ABOR staff. This concern has contributed to a desire by some of the universities to make their mission statements all inclusive. A clear and functional mission statement could improve the efficiency of this review process.
- The mission statement revision process lacks clarity of direction in format and content (because of an desire to allow "bottom up" definition).

  This is an inefficiency that causes repetitive and frustrating experiences for all involved parties at each subsequent meeting relating to mission development or strategic planning details, as firm guidelines for developing drafts do not exist (some guidelines are developed on an ad hoc basis but not for overall direction of the full process).[6]

- The decennial program review process and the budget processes vary to the degree in which they are explicitly linked to planning at the university. This produces an atmosphere where there is no perceived need for a planning process, especially one that is guided by a group external to the university (ABOR). In addition, when plans exist there is some frustration on the part of members of the university community because evidence (e.g., feedback) is not obvious that actions were taken as a result of the plan. At the ABOR level, attempts to link the capital and strategic planning processes have produced some duplication of analyses between these two committees.

Other university processes which function as de facto plans (e.g., they serve to allocate resources among programs) include the Capital Plans (five-year projection from 1988) and the annual operating budgets (continuation and program change budgets).

During the past year, the ABOR coordinated planning emphasis has shifted from developing mission statements and overall goals to defining strategic directions at the ABOR level. However, the lack of clear mission statements for ABOR and the universities has hindered this planning process.

While there are examples of broad mission statements, the good ones are sufficiently specific to provide guidance for the institution and understanding for the university constituents.[7] The actual strategic planning process and administrative structure for planning varies at each university.

Documents have been developed during the last several years of the planning process that:

1. Identified some expected changes in internal and external conditions that will be faced by the universities over the next decade (developed by the Academic Affairs Council);

2. Identified methods of program evaluation and resource redistribution (developed by the Academic Affairs Council);

3. Summarized perceptions of various stakeholders toward possible university missions (research study by ASU under contract from ABOR).

Thus, the processes for revising mission statements and more recently for developing strategic plans suffer from this lack of a clear purpose and clarity of content, disagreement on what the fundamental process and implementation of results should be . A full description of the planning activities from 1983 to 1988 is in the Background section "Description of ABOR/Universities Planning Process, 1977-1988."

RELEVANT PLANNING REPORTS

A university's strategic plan should provide overall direction to the institutions, and should reference more detailed planning efforts in such areas as academic programs, capital acquisition, campus physical development, and financing options. Examples where ad hoc or opportunity driven planning has occurred in the last few years are:[8]

JOINT EFFORTS AMONG THREE ARIZONA UNIVERSITIES'

- Arizona Universities' Study Group on Minority Student Recruitment and Retention
- Tri-University Task Force on Study Abroad Programs
- Tri-University Plan and Process for Affirmative Action Job Group Formation
- Arizona Telecommunication Cooperative Committee
- Capital Planning Process
- Joint Meeting on Off-Campus Education
- Tri-University Life Sciences Plan

ARIZONA STATE UNIVERSITY

- Engineering Excellence Phase I (followed by Phases II and III)
- Health Administration and Policy Plan
- Freshman Year Experience Plan
- Affirmative Action Plan
- Honors College Plan
- Academic Achievement Plan
- Library Plan
- Physics Plan
- Capital Improvement Plan
- Affirmative Action Plan

NORTHERN ARIZONA UNIVERSITY

- Hotel and Restaurant Management Plan
- Yuma Branch Campus Proposal
- Affirmative Action Plan
- Planning Guide 1989-90
- Capital Improvement Plan
- Land Use Plan
- Master Facilities Plan

UNIVERSITY OF ARIZONA

- Undergraduate Quality Committee
- Comprehensive Campus Plan
- Affirmative Action Plan
- Academic Advising Committee
- Teaching Facilities Committee
- Capital Improvement Plan
- Assessment of the Quality and Outcomes of Undergraduate Education
- Information Services Task Force
- Undergraduate General Studies Committee

CURRENT PLANNING PROCESS

Each of the universities submitted revised mission statements, goals and objectives to the Board of Regents in Fall 1985. The information below describes more recent activities. The ABOR staff, in concert with the Strategic Planning Council, is developing a "system-wide" strategic plan, while each university is developing its own strategic plan.[10] The institutional plans will then be coupled with the ABOR plan so state-wide needs are incorporated into the specific university plans.

ARIZONA BOARD OF REGENTS

The Board Strategic Planning Committee was formed in 1984, and in 1986 three Future Needs of the State subcommittees developed reports.[11] The ABOR has also had annual planning retreats for several years, hired consultants in matters of planning, capital, personnel, and information handling, and appointed the Task Force on Excellence, Efficiency and Competitiveness. The current strategic planning process for the ABOR became much more active in FY 88. In this last year, the responsibilities of the Strategic Planning Committee were identified, a "Typology of Instructional Centers" (guidelines for branch campuses and off-campus centers) was developed, general planning assumptions were produced, and the universities were asked to revise their mission and scope statements. The ABOR is in the process of developing a system-wide mission and procedures for identifying areas of special emphasis within the universities.

ARIZONA STATE UNIVERSITY

During FY 88 a process was developed to produce a strategic plan, consisting of an estimated 30 or so pages, by the end of the academic year. The process began with development of a Mission and Scope statement. Faculty, staff, deans, and vice presidents were asked to comment on the 1985 draft mission statement submitted to the Board of Regents. Deans and Vice Presidents established mission and scope statements by college and vice presidential area. A university-wide planning committee refined the overall mission and scope statement and sought further faculty review before finally submitting the document to the Board of Regents in early 1988. The preparation of the document involved an environmental scanning process and ABOR priorities. Individual administrative and academic units developed goals and strategies for achieving the goals, with final review by the university-wide Strategic Planning Committee. The 5-year strategic plan will include these goals, capital improvement recommendations, and a 5-year budget, with provisions for annual updates.

In absence of a strategic plan, the annual Program Change budgets serve as a major indicator of new directions. Guidance for these program change budget requests are based on vice presidential area and subsequent submissions are narrowed in number through review at the vice presidential level. They are then reviewed by the Council of Vice Presidents for final submission to the ABOR.

ARIZONA STATE UNIVERSITY WEST

ASU West was established as a branch campus in 1984 by Senate Bill 1245 after about a decade of discussion of the need for a campus in west metropolitan Phoenix. The campus has established a separate strategic plan (about 30 pages) which after multiple versions is in final draft stages for inclusion in the ASU strategic plan. It includes an overall vision of the future of the campus, a mission, history, an assessment of external environmental conditions and their implications, principles for guiding goal development, institutional goals and strategies (by campus and individual academic and administrative units), and a statement on achieving the mission through the strategic planning process.

NORTHERN ARIZONA UNIVERSITY

The NAU planning process has developed over several years, first in the administrative areas and more recently in the academic areas. Annual revisions in university mission and goals are developed by the senior administration with review by the Council of Councils (representingallacademic/administrative units), followed by routing to deans, directors, and departments heads (by way of a planning guide). This guidance for changes in programs or initiation of new program change requests then is resubmitted and prioritized at the vice presidential level.

Final program change requests are identified by the Budget Development Committee, which also links planning and budgeting. The process involves annual revisions in goals and specific objectives by academic and administrative units and resource reallocation based on evaluation of these revisions. Closely linked to the development of these goals is a process for reviewing the strengths and weaknesses of the institution and identification of external opportunities and threats as they relate to specific programmatic changes. The University Planning Committee develops draft statements for new directions, which undergo further review by the Vice Presidents' Council.

Guidance is given in the Program Change budget cycle by a required linking of new or expanded programs to supporting goals for the unit and university.

UNIVERSITY OF ARIZONA

A formalization of strategic planning began in FY 83 with individual discussions between the Provost and college deans. The subjects included priorities and definition of issues and needs. This same procedure was followed in FY 84, and in FY 85 planning statements were prepared by each college for incorporation into university-wide goals and objectives. Priorities were identified for a 3-5 year period and mission statements were revised at the college level. In FY 86 a draft strategic planning document was developed that included the planning environment, approaches to planning, implementation procedures, and a departmental planning guide.

Beginning in FY 87 each college prepared a revised mission statement, identified its strengths and weaknesses, and listed its external opportunities and threats. In addition, each college specified strategic issues for the next 3-5 years. In FY 88 revised mission, scope, and means statements were prepared. The overall process was developed in concert with deans and departments, and engaged a committee of associate deans for detailed discussions. The process was suspended and restarted during the last two years because of uncertainty related to Board of Regents procedures in planning.

The Program Change budget cycle is left open to all participants. Submissions are ranked at the departmental and college level, but all submissions are reviewed by the President's Council.

CURRENT STATUS OF PLANNING DOCUMENTS[12]

The planning process has become very active and is still developing. For example, in response to a request from the ABOR staff, the universities submitted in February 1988 the most recent planning statement. The previous submission of Mission and Scope statements by the universities was in fall 1985. All these documents are draft, as the current official mission statement remains the 1983 version. These current statements also vary in content and format and are summarized briefly below.

ARIZONA BOARD OF REGENTS

The 9-page draft Arizona University System mission and scope statement was developed in the last several months and is expected to be final draft in late June 1988; the draft includes a brief background statement, a mission of the Arizona University System, and six strategic directions (to heighten the quality of Arizona's public university system by continuing to build three distinguished institutions; to improve the quality of undergraduate education; to develop and strengthen research activities and graduate programs; to extend access to a public university education, especially to under--represented racial, ethnic, and socioeconomic groups; to strengthen the connections of the universities to the community colleges and the K-12 sector; and to increase the contributions of the university system to the economic development of Arizona. It is anticipated that these strategic directions would last for 3-5 years and be replaced by other directions on a continuing basis.

ARIZONA STATE UNIVERSITY

A 39-page document in four sections: ASU overall mission and scope (the Arizona State University System), ASU Main Campus mission and scope, West Campus mission and scope, and a series of appendixes (environmental scan, enrollment management, and support services). The document provides some enrollment guidance and designates disciplinary areas for additional emphasis (between 25 and 50 depending on definition). There are specific notations on internal weaknesses relative to support services.

NORTHERN ARIZONA UNIVERSITY

A 30-page document is in two major sections: A 3-page mission and scope statement and a 27-page listing of goals and subgoals for the university and each college. Included is a description of the type of university and areas of program emphasis. Specific results of an environmental scan or internal weaknesses are not stated at this time.

In addition, NAU has developed three documents for the strategic planning process: 1) Environmental Scanning (a 9-page external scanning and internal program review), 2) Planning, Budgeting, and Evaluation Process Summary (a 13-page description of the these processes), and 3) Planning Guide 1989-90 (a 44-page guide for completion by academic and administrative units) includes worksheets, mission and goals for university and individual colleges.

While these have been in development for several years, the current versions were produced in the Spring of 1988 and have now been expanded for use campus-wide. There is also an "Issues Notebook" which contains one page of executive summaries resulting from the environmental scanning process on specific subjects, and will be enlarged to a complete summary of environmental scanning and internal assessment results in Spring 1989.

UNIVERSITY OF ARIZONA

A 118-page document is in three sections: mission, means, scope. The mission statement includes 19 pages of introduction, history, aspirations, student description, academic program description, and organized research and public service descriptions. The means section includes six pages relating to intellectual leadership, faculty and staff, the campus, and planning and evaluation. The scope section includes 101 pages of mission/description-/emerging areas of individual colleges, organized research units, academic support units, public service units, student service units, and agricultural units. There are no references to specific external trends or internal weaknesses, but internal strengths are cited.

DISCUSSION

SUMMARY

There has been considerable effort expended on university planning in the last 15 years. The steps leading to the 1974 Long Range Plan (16 month process), the first mission and scope statement in 1980 (3 year process), and the strategic planning process begun in 1984 (process not complete) have caused a number of meetings and exchanges of documents. Each planning project has had its benefits and each has taken place in a different setting of external and internal university conditions. There has been a lot of effort expended in human terms and the results are partly measured in increased awareness of the issues and partly in the written drafts for revising the currently approved 1983 mission and scope statement. The written results vary widely in the clarity and focus of missions of the universities.

Improvements in the process might include more attention given to developing a consensus about the key ingredients of a successful planning activity and developing a better understanding of the differences between strategic and long range planning.

A NEW DEFINITION: STRATEGIC PLAN AND ACTION PLAN

Because of the possibility of easing into a traditional "long range" planning process, it might be best to avoid use of the term "long range." The planning process could result in two documents (or two portions of a single document):

- Strategic plan (short document with key choices and rationale made clear),
- Action plan (long document with specific goals, objectives, and methods of achieving the strategic plan).

This would allow the strategic plan to be revised less frequently (perhaps 1-3 years, depending on the degree of change), and to be really strategic in nature. The action plan could then be revised annually and contain the necessary detail for successful implementation of the strategic plan.

SPECIAL CONCERNS TO ADDRESS BY A STRATEGIC PLAN

A strategic planning process focuses on the major choices to make rather than cataloging specific objectives (that is developed in an associated Action Plan). Some examples of the issues to address in such a process include:

- Undergraduate quality and citizen access (including the impacts of enrollment caps either at the college or university level).
- Academic program selections for new resource allocation based on: 1) maintaining excellence, 2) achieving excellence for departments already good, 3) maintaining average effort, 4) maintaining minimal effort, and 5) phasing out a program (or combining with another department).
- Academic program selections for emphasis based on national or international audiences compared to state audiences.
- Relative emphasis on programmatic choices (e.g., building disciplines) or on infrastructure (e.g., building support activities).
- Determining university-wide priorities vs college priorities.
- Determining sequence of capital project funding and resource availabilities.
- Determining the administrative and management structure of the university and its operating units in relation to other changes made during the planning process and changes in information technology and management options.

PLANNING PITFALLS

While the essential ingredients for successful strategic planning have been discussed, it is worth repeating a few factors that may guarantee failure if they are not addressed. Activities to avoid include:

- Any process that does not have the clear support of the senior administration in the developmental stages and use by senior administration in the completed stages; this support must be communicated to all parties.
- Any process that develops a simple wish list for all wants; the areas for focus must be few or insufficient resources will be available for developing those areas.
- Any process that does not honestly identify external changes and internal weaknesses, or consider realistic assumptions.
- Any process that does not involve the faculty and other stakeholders throughout the planning effort.
- Any process that is perceived as being a bureaucratic exercise; if this is the case the results will not be the same as when the interest is present.

A few special planning activities which Arizona should be especially aware include:

- The importance of stating and agreeing on planning assumptions among the relevant parties;
- The need for careful attention to special opportunities and or threats for Arizona universities which relate to

possible futures for the state;

If the process misses any of these features, it might as well not be referenced as a strategic planning process.

TWO APPROACHES TO COORDINATED PLANNING

The Arizona universities have been able to function relatively independently for a long time, and this is a strength (noted by several Task Force consultants). In other states, this type of "hands off" organizational structure has allowed for the strongest universities as well.

Therefore the approach to planning should preserve this relationship and should be efficient with a minimization of effort. On the other hand, the universities need involvement by the Board of Regents in the institutional planning process. The Board has the oversight of institutional planning as is one of the Boards' major obligations; it also provides a process to connect the universities to the social and political needs of the state in ways that augment the university activities in these areas.

The current approach has only recently been developed and is still undergoing discussion. Assumptions for any approach are that

1) university strategic choices need to be made,

2) university goals must be related to a series of measurable objectives, and

3) each university must develop a tracking procedure to monitor progress. Within that framework, there are two distinct approaches that could be taken.

EXAMPLE 1: BOARD ORIENTED

The Board could identify "state needs" that might be in addition to the priorities developed by the universities. The Board could then require that the universities specify how institutional priorities will be linked to the Board identified needs. The Board could require specific goals and measurable objectives at the institutional level to link with the state need, and could include specific resource estimates for the planning period. The advantage of this process is that the Board is better assured of success for the participants in meeting the goals but the disadvantage is that the process will cause more staff effort at all levels.

EXAMPLE 2: UNIVERSITY ORIENTED

The universities could identify "state needs" in addition to institutional interests through the strategic planning process. The Board could then encourage the universities to incorporate these state needs within the university priorities. The Board could monitor the institutions to confirm that they are adequately addressing the state needs as well as meeting the universities' own goals and objectives. The advantage of this process is that the universities are accountable to the Board but can avoid additional details of paper handling. The disadvantage is the Board does not have a direct link in university activities directed toward state needs.

A CHOICE

A combination of both approaches seems to adequately address the concerns of both the Board and the universities, and would allow an efficient process. This also could involve the joint identification of state needs by the Board and the universities. As the Board sets selected goals (goal is more appropriate than strategy in this context) for the Arizona universities, it will be clear to the universities that they should incorporate some of those goals into university directions. The budget allocation process (continuing or program change) allows the Board appropriate review of university decisions on an annual basis.

The universities could identify their own goals and objectives that relate to the Board goals, with the Board formally approving those institutional goals and objectives.

However, care should be taken to separate strategic planning from long range or tactical planning. It is easy to confuse these two processes. The strategic planning should be done less often (major review each 3-5 years) and the "action plan" for implementation should be specific and revised annually.

An evaluation process for each strategic plan (e.g., each institution and ABOR) must be a third component to the planning activities. Without separating these activities, there is danger in losing the "strategic" portion of the process.

CONCLUSIONS

1. Each university currently has a planning process. These processes vary by university and the resulting plans vary. Some are clearly articulated to a broad group, some are discussed informally with a wide group but not formally communicated, some are detailed and others are general in structure and format; all are under revision.

2. A good deal of activity has been generated in the planning activities over the last 15 years with some useful guidance documents developed. However, in recent years planning suffers from a lack of defined process and a perceived lack of genuine commitment in some institutions. There seems to be a sense of frustration based on the amount of work undertaken relative to the (lack of) planning products in place.

3. The current budget process allows the flexibility required (in the continuation budget and program change budget) to provide resource redirection based upon the strategic planning actions.

4. The mission statement is a fundamental document to provide guidance to the other components of a strategic plan, but the Arizona university system mission statement and the university's mission statements have not been formally approved prior to actions taken on more detailed planning efforts. The mission and accompanying few strategic directions constitute the vehicle for broad communication of future university movement. To be accepted in the end, the mission statement and the key elements of the plan require that the relevant constituencies of the universities be involved in their development from the earliest stages.

5. The planning process should produce clearly stated and understood strategic directions (at both the university level and the ABOR level).

   These directions should be expressed in such a manner to allow tracking of progress but also allow for special areas of action when warranted within the context of the overall strategic plan. If the plan is too imprecise,

243

makes reference to directions that are not achievable, or contains too great detail, it will not be functional.

6. The universities generally have evolved without the need for a formal strategic plan. This was successful in the past primarily because of the external conditions (e.g., funding availability) and internal goals and choices (driven both by individual opportunities and concerted efforts).

   However, the future portends to be more uncertain, resource attainment more difficult, the delayed impacts of earlier years of growth are becoming evident, and the changes in the academic disciplines and needs of society are becoming evident.

7. The current planning process has been evolving since 1983, when a major change of approach was taken. From the earliest times of this process, there has been confusion regarding format and approach (as indicated by questions in meeting minutes) and required clarification of the format and procedure has been requested by the participants; this situation persists.

8. The budget is the most basic planning instrument and reflects broader planning efforts (e.g., capital planning, academic planning). It also reflects the results of specialized studies (e.g., branch campus, new undergraduate curricula), and it the reflects results of internal periodic reviews. However, there is generally no clearly stated, integrating, long-term futures oriented, strategic plan for the universities or the ABOR.

9. Funding variation through the state appropriation process has been significant, causing disruptions in planning as well as annual operating activities. In the last 10 years, the range of budget changes for individual campuses has been -5.1 to +22.6 percent. In 4 of the last 7 years (FY 82-88), the budget has been revised down during the year for which it was appropriated. This makes planning and operating difficult and suggests some fundamental flaw in the funding process (e.g., the high reliance on sales taxes in the state tax structure allows greater shifts in resources as the economic conditions shift).

10. For the Board of Regents to provide adequately for oversight of the planning process, the Board will have to identify and discuss the relevant questions to ask, the types of information to assimilate to address the questions, and the format for final presentation. The ABOR should approve the types of data to be collected to develop that convey the needed information. Collection of data without first identifying these questions will lead to inefficient use of the Board, Board staff and university resources. Further effort will be needed during this process to carefully identify the uses of the data because of slightly different definitions or limitations by virtue of its collection method.

11. The Arizona universities have different histories, areas of emphasis, constituencies, and opportunities. Accordingly, they are likely to have different futures and the planning related activities should acknowledge these distinctions. This means there will be duplication of some programs

where the external need and internal capabilities are demonstrated through the strategic planning process.

12. Activities related to university planning involve the ABOR staff and the three universities in a number of ways, including academic program and degree changes, decision packages/program changes, and service areas. The multiple levels of interaction during these processes are done in such a manner as to increase the competition AMONG the universities and to increase meetings and discussion times in absence of more focused guidance (e.g., mission statement and strategic plan).

13. The strategic planning "results" are still in development, but the 5-year capital plan has been approved (because of the state mandate for such a plan). When the strategic planning process is sufficiently far along, the capital plan should be revised (this is the intent of the ABOR).

The current Board of Regents' Policy on Building Construction, Remodeling, and Renovation (approved January 1988) has several links to the strategic planning actions for the Board. These actions are: a) approve project initiation by Board Strategic Planning Committee; b) annual review/update of strategic plan by university for major goals, proposed objectives; c) define capital projects necessary to achieve an objective; d) strategic plans shall identify major capital and operating implications of key strategies (where the capital must contribute to specific objectives or meet other important criteria); and e) multiple involvement of the Board Strategic Planning Committee and the Capital Review Committee on facilities requests.

This process is new and the duplication in part is due to the capital process getting ahead of the strategic planning process. At the present time it leads to duplicate reviews (although at different levels of detail) and increased paperwork. These processes should be reviewed at the completion of the strategic plan (ABOR intends to do this).

14. The planning process has been inefficient because of a) competing activities requiring heavy resource commitments from the Board staff and that of the universities, b) a change of definition of the process from the currently approved "plan" of June, 1983, with differing instructions and limited format suggestions, c) varying degrees of "education" for the campus community about the rationale and need for planning and involvement of external constituencies, and d) movement of issues detail without clarifying the overall process and focusing on key elements.

15. The strategic planning process is variable among the campuses in the approach, content, format, participants, and administrative support.

16. While planning improvements are being undertaken, major events are addressed inadequately relative to the impacts on the universities (or state) for the next decade or so. A recent example is

the envisioned venture with Sematec Corporation, where the ABOR and the universities identified commitments that might have significant impacts (both positive and negative) had they been more fully evaluated. Because of the scale of this project, the full impact on the universities would have been better understood if a strategic plan and an impact analysis process had been in place. For activities of this magnitude, there are implications that are not obvious on initial analysis. The planning process could provide a framework for making decisions on future projects of this scale.

17. Goals of the Board of Regents are not published consistently on an annual basis, although they are discussed informally. For example, in the last 5 years goals were publicized (through Regents' newsletter) only for FY 85 and FY 86.

18. The universities and the Board of Regents' office are undergoing rapid enhancement of information handling capabilities for better support of decision making.

19. The information transmitted presently to the Board of Regents' office by the universities is not identical in definition, represents different formats, and lacks clear submission requirements. The data categories developed by each university for internal studies and submission to the board are similar (but still different).

20. The information available in the Board of Regents office is not centrally cataloged for easy identification and retrieval and computerization is not applied to all available relevant data. A project titled "Arizona Regents' Information System (ARIS)" is currently addressing this concern.

RECOMMENDATIONS [13]

- THE ABOR SHOULD DEMAND, BUT NOT NECESSARILY SPECIFICALLY STRUCTURE, A STRATEGIC PLANNING PROCESS AND PROVIDE FOR OVERSIGHT OF ITS SUBSEQUENT ACTIVITIES; THIS IS ONE OF THE MOST IMPORTANT FUNCTIONS OF A GOVERNING BOARD.

  A strategic planning process is underway and should be reviewed as soon as possible after completion of this Task Force study; at that time additional Task Force developed information will be available and the current process will be sufficiently defined to warrant assessment. Special care should be taken to incorporate other planning into strategic planning (e.g., capital), as well as evaluate mission statements, and realistic assessments of external demands and opportunities and internal strengths and weaknesses. While the specific structure of the planning process should be left to the universities, the ABOR should require that the principle components of the plan be defined and agreed to by all parties.

- THE BOARD SHOULD EVALUATE THE MOST APPROPRIATE MANNER TO REVIEW FUTURE STRATEGIC PLANNING ACTIVITIES AFTER THE CURRENT STRATEGIC PLAN IS DEVELOPED.

  The current strategic planning process will move to a new phase within a year or so. Since the role of strategic planning is involved across all committees of the Board, an evaluation should be completed for making the Board Strategic Planning Committee a committee of the whole and limit its activities to strategic (rather than operational or routine) issues and choices.

- THE RESPECTIVE PLANNING ROLES OF THE BOARD, THE BOARD STAFF, AND THE PRESIDENTS OF THE UNIVERSITIES SHOULD BE IDENTIFIED.

  These roles should be defined in advance of beginning the planning process in earnest. When each party fully understands and agrees to the roles of the other parties, the planning process will move along more smoothly.

- THE PLANNING PROCESS SHOULD BE STRATEGIC IN NATURE.

  The role of the Board of Regents should be limited to policy related issues and oversight, with implementation details developed by the individual universities. While the Board should develop and communicate its own strategic directions for itself (in addition to those of the universities), the Board should focus on providing oversight capability for evaluation of the strategic directions. Care should be taken to avoid detailed data collection activities or rule based responses that may be not be central to strategy development or monitoring of progress. Specific implementation procedures might be referred to as "action plans" to maintain the "strategic" nature of the planning process.

- THE UNIVERSITIES SHOULD LINK PLANNING TO THE BUDGET PROCESS AND PROGRAM ASSESSMENT AND REVIEW WHILE DEVELOPING SUPPORTING MANAGEMENT INFORMATION SYSTEMS.

  The planning processes vary among the universities in their linking planning to budget decisions and assessment outcomes. Such links must be established and followed if the planning process is to be considered effective.

- THE BOARD OF REGENTS AND THE UNIVERSITIES NEED TO COMMUNICATE THEIR MISSION (SYSTEM-WIDE AND INSTITUTION SPECIFIC) AND STRATEGIES TO ALL CONSTITUENTS.

  Once a series of strategic choices have been developed, with appropriate involvement of the various constituencies, the results should be widely communicated. This would remove the current uncertainty and mixed signals some receive in absence of explicit mission statements or university directions.

- THE UNIVERSITIES SHOULD PROVIDE SELECTED EXISTING AND RELEVANT INFORMATION TO THE ABOR FOR PLANNING OVERSIGHT PURPOSES.

Such information should be forwarded to the Board staff and the other two universities. It would include copies of relevant reports already requested by external groups (the most important of these [IPEDS for the US Department of Education] is already shared with the Board staff). These data could then comprise a small database for the Board staff to initiate oversight activities of a number of university activities that cumulatively comprise the strategic planning components. These data should be officially reported by a knowledgeable professional and not relegated to a clerical function (unless clearly stated procedures are developed to maintain data quality). Additional data could be developed by ad hoc studies done for planning activities or other purposes. Where forecasting is necessary to develop data, ranges and associated discussion should be provided to understand the limitations and possible variations. The intent of this recommendation is not to provide ALL data to ABOR that is presently sent to other groups, but to suggest that a good deal of data presently exists that could be provided to assist the ABOR in its oversight role.

- THE UNIVERSITIES SHOULD CONTINUE THEIR DEVELOPMENT OF IMPROVED DECISION SUPPORT SYSTEMS AND THE BOARD OF REGENTS SHOULD DEVELOP AND MAINTAIN A LIMITED DATABASE FOR ANALYZING AGGREGATE DATA DEVELOPED BY THE UNIVERSITIES.

Only data that is necessary for appropriate information development should be collected by the Board of Regents rather than duplication of detailed data systems of individual universities. The necessary data for most information needs are already submitted by the universities to the Regents so do not require any significant additional workload on the part of the universities. It is important that the purpose and collection process of such data exchange are identified and understood by all interested parties at project initiation.

- THE BOARD OF REGENTS SHOULD SPECIFY A MINIMUM CONTENT AND FORMAT FOR THE UNIVERSITY FACT BOOKS.

Each university and the Board produce an annual fact book. The types of information varies by content and format, and the books vary by size. After a minimum amount of required data are presented, additional university determined data could be included. The current procedure does not provide sufficient similarity in presentation, content, and definition to allow the Board of Regents easy comparison and understanding of relevant trends.

- THE BOARD OF REGENTS SHOULD DEFINE WHAT SUBSTANTIVE QUESTIONS THEY WOULD LIKE ESSENTIAL SUPPORTING INFORMATION FOR (INCLUDING THE FORM AND BASIC CONTENT) AND REQUEST BOARD STAFF TO IDENTIFY WHAT TYPES OF INFORMATION WOULD SATISFY THE REQUEST, THUS ALLOWING THE REGENTS' STAFF AND UNIVERSITY STAFF'S TO DETERMINE THE TYPES OF DATA TO COLLECT.

In this context, it is assumed the purpose of data collection and its conversion to useful information formats is to improve decision making by the by the universities as well as the Board of Regents but not to the point of the overall system becoming overwhelmed in data collection and transmission.

- THE BOARD OF REGENTS SHOULD REQUIRE A MEMORANDUM OF UNDERSTANDING CONCERNING DATA DEFINITIONS BETWEEN THE REGENT'S STAFF AND THE UNIVERSITIES.

  Such a memorandum of understanding should be developed among the universities and the Regent's staff to clarify the specific definition of the types of data submitted to the Regents.

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PART II

BACKGROUND

UNIVERSITIES IN TRANSITION

The universities in Arizona have undergone significant change in a relatively short time (about two decades). While many universities in other states have suffered enrollment declines or budget constraints, and will continue to do so, the Arizona universities have benefited from a growing state, aggressive university leadership, and an increasing national and international reputation. The changes underway in the universities are not occurring simply because of this general growth, but also through elimination of old programs or courses and addition of new ones.[14] The universities are complex institutions that undergo continual change. Some of this change is demand driven (e.g., changes in courses, degree offerings), some is planned (e.g., focus in a few disciplines), some is opportunistic (e.g., selection of an option when conditions are favorable), and some is caused by external factors (e.g., budget reductions). As an example of this continual change a listing of the numbers of courses and programs changed in the last five years is in Tables 5-6.[15]

Table 5. Changes in University Programs and Courses FY 84-88

	New Courses			Deleted Courses			Add Deg Prog			Delete Deg Prog		
Year	ASU	NAU	U A	ASU	NAU	U A	ASU	NAU	U A	ASU	NAU	U A
FY 88	58	6	12	17	0	0	0	1	5	1	1	1
FY 87	124	62	197	1	35	343	1	2	9	3	3	5
FY 86	13	0	45	14	0	6	2	0	1	0	2	3
FY 85	96	9	429	168	117	363	2	1	3	1	2	4
FY 84	37	44	116	0	35	16	3	2	1	1	0	0

Table 6. Changes in Centers and Sunset Reviews of Programs

	Centers/Labs			---- Sunset Reviews ----					
	Additions			Continue			Disband		
Year	ASU	NAU	U A	ASU	NAU	U A	ASU	NAU	U A
FY 88	3	0	0	2	0	3	0	1	2
FY 87	2	1	2	4	2	3	0	0	2
FY 86	0	0	1	3	0	3	1	0	1
FY 85	3	2	2	6	2	3	2	1	2
FY 84	3	6	4	0	0	0	0	0	0

There are several major elements to the changing conditions for Arizona universities that are important background elements for any discussion of strategic planning.

First, for all practical purposes the number of universities is changing. In FY 1985 the first separately budgeted branch campus was developed as Arizona State University West, and in FY 89 an off-campus center was requested as Northern Arizona University, Yuma (initial request was for a branch campus). In the last decade, small urban locations have been established by ASU in Phoenix and by UA in Sierra Vista. These changes now effectively provide for three main campuses, one medical school, one branch campus built as a new campus, one off-campus center combined with the physical plant of a community college in a rural county (Yuma), an off-campus site as a downtown center, and an off-campus center in a rural county (Sierra Vista).

The origins of these campuses and the management of their future will require greater understanding of the growth dynamics within and outside the Arizona universities. They also represent an opportunity to evaluate which approach might be most appropriate as the demand for university services begin to rapidly increase in the latter part of this century.

Second, the growth rate of the universities has been significant. Following a national pattern of notable increases in higher education, the Arizona universities' enrollments grew rapidly from 1955 to about 1975, then had a moderate growth until the late 1980s. During this 30-year period, the relative percent of graduate students increased (although it has remained relatively constant during the last decade), the percent of part time students increased (this continues), and the state population grew rapidly.

Because of the demographic changes taking place in the United States and in Arizona, the growth rate of the Arizona universities over the next 15 years cannot be determined by a simple extrapolation of past experiences.

Third, the Arizona universities have changed their focus and their vision of the future. The University of Arizona was designated (and retains) the land grant status at establishment (1885). Arizona State University was originally designated as the Territorial Normal School (1885) and after other names was changed to university status in 1958. Northern Arizona University was established as Northern Arizona Normal School (1889) and after other changes was converted to university status in 1966. These status changes for two of the universities have come during a period of rapid enrollment increase and changing external demands on all the universities. The impacts of this rapid growth have placed stresses on the university support systems; these impacts continue today.

Fourth, the changes occurring in the state, nation, and world are affecting the universities. Multiple demands are placed on a university today, including accountability for and assessment of student learning; research and technology cooperative efforts with business, government, and industry; development of a quality educational experience that includes growth in technical knowledge, broad understanding of societal history and emerging issues, and critical thinking and communicating skills; access of disadvantaged students (e.g., by race, income, geographical location, pre-college preparation) and retention of students after enrollment.

These demands require increased resource expenditures (human, physical plant, and financial), limit flexibility of administrative choice, and invite oversight by others into university management activities. There are also changing economic conditions (e.g., national debt, international trade, and internationalization of the economy), changing demographic trends (e.g., increasing minority population, aging baby boom population), a changing structure of the economy (e.g., greater service jobs, high debt service, increased high technology), and shifts in college majors desired by students. These factors raise questions about which directions to take and how to adequately fund them.

Fifth, primary funding for capital construction has shifted from state funded to university bonding over the last decade; early bonding was limited to auxiliary activities (e.g., dormitories) and is now available for all types of construction (Table 7).

Table 7. State Appropriations vs Bonding for Capital[17]
(Millions of Dollars)

Years	Bonding	State Capital Appropriations
FY 68-73	6.4	62.0
FY 74-78	18.0	44.0
FY 79-83	142.0	51.0
FY 84-88	229.0	39.0

The recently approved Capital Improvement Plan for FY 89-93 (Tables 8-9) summarizes the significant expansion plans for each of the universities in the near term. These major growth enhancements come at a time when there are no formal strategic plans in place for the universities.

Table 8. ASU and ASU West 5-Year Capital Improvement Plans[18]
(Millions of Dollars)

Fiscal	----- ASU -----		----- ASUW -----	
Year	Request	Total %	Request	Total %
1989	77.8	38.6	$ 19.2	40.0
1990	5.4	2.7	25.8	53.7
1991	66.2	32.8	1.2	2.5
1992	39.3	19.5	1.4	2.9
1993	13.0	6.4	0.4	0.8
Total	201.7	100.0	48.0	100.0

Table 9. NAU and UA 5-Year Capital Improvement Plans[19]
(Millions of Dollars)

Fiscal	----- NAU -----		----- U A -----	
Year	Request	Total %	Request	Total %
1989	$ 21.6	38.2%	$84.7	30.2%
1990	13.7	24.2	50.3	17.9
1991	5.6	9.9	45.3	16.1
1992	12.3	21.7	52.6	18.7
1993	3.0	5.3	15.1	5.4
Total	56.6	100.0	280.3	100.0

It is important to place each of these items in an overall framework in which to understand the changing environment. Although the universities have undergone significant changes, they retain the characteristics of historic development patterns.

This factor is significant, because the pathway into new strategic directions will be influenced by the current structure and activities of the university. For example, the current degree productivity of the three campuses is focused in a few disciplines (Table 10) and the major selections of new Program Change requests in the annual budget cycle are significantly different for each university (Table 11). In addition, the changes in the external environment will have a significant influence on how the universities choose to direct their resources. The infrastructure entries for ASU, ASUW and NAU (academic or administrative staff/support) are grouped because that is the way the program changes were requested.

Table 10. Disciplinary Degree Focus by Arizona Universities*
(Percents are in parentheses and indicate BS/MS/PhD as percent of degrees of the three types).

ASU		NAU		U A	
Business	30/18/11	Business	19/8/0	Business	25/10/3
Education	11/22/40	Education	5/60/82	Engineering	15/13/8
Engineering	8/11/10	Communications	7/0/0	Education	7/25/16

Listed in order of decreasing undergraduate degree amounts over 2-year period FY 86 and FY87; only top three degree areas listed. Categories defined by Higher Education General Index

Table 11. Program Change Subject Focus by Arizona Universities*
(Subjects found in top 50% of Request Dollars)

University	Subject	Percent
ASU	Academic Staff/Support	21
	Engineering	20
	Administration Staff/Support	17
ASUW	Academic Staff/Support	52
NAU	Academic Staff/Support	19
	Computing	17
	General Undergraduate	10
	Off-campus instruction	9
U A	Biological Sciences	24
	Physical Sciences	19
	Engineering	15

*Summary of nine year period FY 81-FY 89, based on total funding requested by university to ABOR; this does not represent actual funding. Not including University of Arizona College of Medicine (where all subjects are listed as medically related). ASU West represents 5 years of data.

However, they can be broken down into the disciplines but are still in the "support" category rather than building new programs. The UA tends to list program development by individual discipline and requires less "infrastructure" requests because of a lesser growth rate and longer history of university status.

SHAPING AN ACADEMIC STRATEGY: EXAMPLES OF NON-PLANNING"

The following 10 comments on what a plan "should not be" were developed by George Keller. These points combined with other examples of what a plan "should be" serve to better define the development and uses of a strategic plan.

1. IT IS NOT THE PRODUCTION OF A BLUEPRINT

   The idea is not to produce a fat, detailed document that everyone should follow but to get all the key people thinking innovatively and acting strategically, with the future in mind. Strategic planning involves continuous adjustments to shifting conditions, with a central strategy in mind. The strategic plan may be very simple, like General George Marshall's core strategy of beating Nazi Germany first, then defeating Japan. It is often a matter of a few concepts on paper or a few pages of typescript.

2. IT IS NOT A SET OF PLATITUDES

   Often an institution's goals are given as the education of youth; the training of critical thinkers; or teaching, research, and service. This is like saying you believe in liberty or have faith. Strategic planning means the formulation of succinctly stated operational aims.[1] It is specific, not vague and vapid.

3. IT IS NOT THE PERSONAL VISION OF THE PRESIDENT OR BOARD OF TRUSTEES

   A strategy is based on calculations about the markets for your services and probable external conditions such as the economy's vitality, population changes, and the preferences of political leaders and state board of higher education officials, as well as your institution's traditions, academic strengths, and financial ability. An academic strategy will of necessity include a measure of the president's own vision, sometimes a huge measure, but never to the exclusion of considerations of other realities.

4. IT IS NOT A COLLECTION OF DEPARTMENTAL PLANS, COMPILED AND EDITED

   This form of bottom-up planning was a popular pastime in the 1960s and is still practiced at some places. But strategic planning is for the whole institution and for its long-term stature and excellence, not for satisfying dozens of separate internal hopes spun in isolation from a college's overall needs. A university is something more than the aggregate of its parts. A strategic plan is something more than a list of individual wants and aspirations.

5. STRATEGIC DECISION MAKING IS NOT DONE BY PLANNERS

   As one planning official wrote, "First we ask: Who is leading the planning? If it is a planner...we are in trouble."[2] In strategic planning, the planner does not plan. He or she prompts and helps the line officers to plan with statistics, forecasts, institutional data, the best reports by outsiders and on competitors, and visits to your campus by other strategists, scholars, or consultants. The university planner's duties are two: arranging the process of planning and providing crucial information that helps key officers make decisions that are informed and sensitive to current and emerging realities. It is the president, provost, chairman of the board, financial vice-president, deans, and departments heads who should decide on both the institution's strategy and its implementing tactics. Unless the chief operating officers subscribe-or at least feel they cannot ignore or torpedo the strategy-the plan will not sail.

6. IT IS NOT A SUBSTITUTION OF NUMBERS FOR IMPORTANT INTANGIBLES

Data are used. Computers are employed. Financial forecasts are made. Models may be tried. But these are introduced to sharpen judgments, analyses, and decision, not to substitute for them. They yoke facts to the executives' feel; they bring more enlightened intuition. Quantification is provided mainly to enrich qualitative sagacity not replace it. The essence of academic strategy is decision making. And computers don't make decisions, people do.

7. IT IS NOT A FORM OF SURRENDER TO MARKET CONDITIONS AND TRENDS

Formulating a strategy does not entail giving up all your college stands for in order to get tuition-payers or to go with the flow. It does require you to be aware of the likely markets for higher education, the new forms of delivering information, and the developing conditions that will affect your college and its goals in a profound way. But the Juilliard School does not switch out of music when the arts are in the doldrums, and Illinois's Wheaton College did not drift away from its Christian evangelism moorings during the secular hedonism of the 1965-75 decade. If you intend a wilderness trip, it is wise to have maps and the right equipment and clothing; it does not mean you have to live like primitive people or animals in the wild.

8. STRATEGIC PLANNING IS NOT SOMETHING DONE ON AN ANNUAL RETREAT

It is ongoing, continual, not an activity done separately, away from the classrooms, budgets, laboratories, and libraries. Special sessions are necessary during the formulation stage and when special threats arise. But planning itself is integral not occasional.

9. IT IS NOT A WAY OF ELIMINATING RISKS

If anything, strategic planning increases risk taking. It fosters an entrepreneurial spirit, an readiness to start new ventures. It encourages boldness about opportunities and aggressiveness in the face to threats. In doing so, it often causes disruption. But it recognizes with the prophetic economist Joseph Schumpeter that in our new world of rapid technological advance and shifting international conditions the competition is less and less from small differences in price, size, or quality and more and more "from the new commodity, the new technology, the new source of supply, the new type of organization--competition ...which strikes not at the margins of profits and outputs of existing firms but at their foundations and their very lives." A clear strategy helps a university take more calculated risks, more risks with a purpose, and proper, necessary risks that enhance the long-term viability and quality of a campus.

10. IT IS NOT AN ATTEMPT TO READ TEA LEAVES AND OUTWIT THE FUTURE

Of course, the future is unpredictable. But it is not a random walk. There are likelihoods, built-in dynamics, national character, and even a few near-certainties. Strategic planning is an effort to make this year's decisions more intelligent by looking toward the probable future and coupling the decision to an overall institutional strategy. It is not a phantasmagoria about tomorrow. It is a set of decisions that need to be begun now if there is to be a secure future--decisions based on the best evidence there is about the unpredictable but not wide-open future.

DESCRIPTION OF SELECTED PLANNING PROCESSES FOR OTHER UNIVERSITIES

The strategically oriented planning processes of the following universities are listed to identify the variety of approaches. Each plan publically identifies specific administrative-academic areas of the university for resource emphasis.

UNIVERSITY OF MINNESOTA

The most current academic planning process resulted in a 95 page February 1988 document "Commitment to Focus: Academic Priorities 1988-1993." This is the fifth institution-wide academic planning activity since 1975 for the Twin Cities campus, and therefore has had a series of earlier efforts to build upon. It is based on a series of studies to match meeting society's needs and the University's aspirations. The process was initiated by a "Commitment to Focus" essay written by the President, and involved a Faculty Consultative Committee and an Advisory Committee on Planning; the process was administered and staffed by the Office of Provost.

Included are university priorities grouped by general health of the institution (6 priority areas), core programs (5 priority areas), land-grant related programs (9 priority areas), and specific opportunities for building quality (7 priorities). The document lists these specific priorities and identifies resource links to public and private funding; additional planning efforts will follow from the priorities. Specific academic units developed "Strategy for Focus" plans for their areas and these are summarized from the unit perspective and the administrative perspective; a judgement (with rationale) is then provided for taking action. Examples of actions include reducing undergraduate enrollment, restructuring academic units, improvements in infrastructure (e.g., computing, library, instructional equipment), and possible elimination of specific departments.

PENNSYLVANIA STATE UNIVERSITY

Beginning in September 1983, the Board of Trustees directed the University President to develop a strategic plan; six purposes for the planning process were identified at the initial announcement. The President then issued a series of seven principles for guiding strategic planning (developed by two standing committees). These guidelines basically focused on fostering strategic thinking and identifying strategic decisions to set priorities for resource allocation. A year later the President issued a Strategic Planning Guide, consisting of external (opportunities/threats) and internal assessments (strengths/weaknesses), methods and criteria of program evaluation, identification of strategic planning units, and memberships of a series of relevant committees. The most recent university-wide communication is a "Statement of Principles: Stragegies of a Comptehensive University" issued in September 1986; this statement includes goals, recent initiatives and achievements, and specific principles.

Strategic planning is coordinated by the Office of Planning and Analysis, which is responsible for recommending modification in the evolving process. In 1987 a selective academic program review process was initiated, and the capital budget development process was tied more closely to strategic planning. In November of each year, individual college and administrative units submit either a revised comprehensive strategic plan or an update to the existing strategic plan. These submissions include a three-year projection of unit resource requirements, and become the basis for annual planning and budget hearings. One element of the resource projections is the identification of prospective reallocations within the unit.

During the summer months each year, each unit head meets with the provost, budget officer, and planning officer of the University to review planning progress, identify emerging issues, and discuss that year/s resource allocation decisions.

CONTENT OF A TYPICAL STRATEGIC PLANNING PROCESS

While there is a variety of approaches to strategic planning, the final product should address these components.

OVERALL GUIDELINES

1. Establish an on-going, continuous process of strategic planning and management characterized by proactive, strategic thinking and attitudes, and by on-going environmental scanning/data gathering and relevant impact analyses. Begin the process by some informational meetings so all participants understand the approach and concept.
2. Develop a vision statement (to allow some very long term realistic targets - say 20 years) and a mission oriented document (charter-like in content and size) to provide a framework for more detailed analysis and understanding. After the process is completed, the mission (pragmatic) and vision (idealistic) document would be revised.
3. Develop a broad understanding of the external environment, identify (realistically) internal strengths and weaknesses, and designate a few areas (selected in relation to anticipated resource availability and demand) for special emphasis (new or existing areas). After the process is complete, develop a concise mission statement to communicate the essential content of the strategic plan to all appropriate audiences.
4. Compile the strategic choices or recommendations of the individual colleges and departments within the

university (bottom-up planning) and combine into a first draft plan (taking care not to simply staple the individual components together).

SPECIFIC CONTENT GUIDELINES

1. VISION OF THE FUTURE

A brief statement describing the university in the 21st century. This would allow optimistic but realistic views to be identified and form the basis of focusing on more detail in other components of the plan.

2. MISSION STATEMENT

A brief statement describing the university today and in the next decade or so. This would provide realistic long term targets, outline the type of university, the constituents, the activities. An additional component might include the SCOPE of the universities (e.g, degrees offered, geographical areas covered).

3. PLANNING ASSUMPTIONS

A listing of the central assumptions made for the planning period. This avoids the "implicit" assumptions of others by requiring they be stated and debated.

4. EXTERNAL CONDITIONS

Identification of existing and emerging trends, special areas of opportunity, and areas of threat or concern. This effort might involve cooperation among the universities, the Board, and the Board staff.

5. INTERNAL CONDITIONS

Identification of strengths, weaknesses, individual planning efforts, trends involving university activities, and existing studies or improvements.

6. STRATEGIC DIRECTIONS

Selected directions to take based on matching strengths, weaknesses, opportunities, and threats. These would be clearly articulated to all relevant constituencies and change over time.

7. IMPLEMENTATION MEANS

Stated methods of linking the planning process to budgeting, coordination with other planning activities, and development of action plans to accomplish the strategic directions identified in the process.

8. FEEDBACK PROVISION

The planning process is iterative, and the various components will change as they are reevaluated. It may take 2-3 years to "smooth" the process and its components.

MISSION STATEMENT GUIDELINES

There is a variety of viewpoints among the participants in the process on the purpose, format, and use of a mission statement. Because of the fundamental importance of a mission statement to the strategic planning process, a few guidelines are developed below to help clarify the term within the context used in this paper.

PURPOSE

- The institutional time frame is greater than any one administrator, and the mission statement identifies the organization. It differentiates the organization from others that have similar activities.

- The mission statement communicates to internal and external constituencies the essential activities of the organization. A well written mission statement should provide sufficient direction for managers of various administrative levels to make resource allocation decisions which are relatively consistent in rationale throughout the institution.

- It defines the scope of activities (e.g., range, breadth, bounds, limits) of the institution. It defines what the institution will AND will not do.

INGREDIENTS OF SUCCESSFUL MISSION STATEMENTS

- Content is upbeat, inspiring, and optimistic in composition but still sufficiently realistic to be credible.

- Writing is clear and concise, with no mutually inconsistent statements. Terms selected should have common understanding by all readers.

- Includes sufficient specificity to distinguish the organization from similar institutions.

- Includes what the institutional focus is and what major activities it will not engage in (including current and foreseeable future).

- Identifies client groups to be served, how the institution serves each client group, and what values they expect to receive from the institution.

- Clear definition of what the organizational purpose(s) is.

In summary, do not write something unless you mean it. Identify the values of the organization by way of mission statement content. Provide a yardstick against which daily decisions can be made. The overall size might be 1-2 pages at most, and be widely distributed. Do not clutter the mission statement by adding unnecessary content.

DESCRIPTION OF ABOR-UNIVERSITIES PLANNING PROCESS, 1977-1988

1980 MISSION STATEMENT PROCESS

The following listing is from the 1980 mission statement process and is based on submission of answers by the universities to a series of questions developed by the Board of Regents' staff. It involved summarization by the Board staff and several iterations of review and comment by the universities. It involved selected leaders of the business community, other components of higher education in Arizona, and selected legislators. Included was a series of assumptions, limitations, and purpose. It began with "the clear definition of each institution's mission and scope is the very cornerstone of any rational planning process in a university."

The purpose of the mission statement was identified as:

1. Promote access to higher education by insuring that opportunities for all qualified citizens are available;

2. Enhance the diversity of campuses and programs by identifying their unique characteristics and avoiding tendencies for universities to become more and more like one another;

3. Improve quality by establishing missions that discourage the lowering of academic standards in the period of possible competition for students;
4. Insure economy by reducing the potential for unnecessary duplication;
5. Promote credibility by providing each public segment and institution with a realistic and explicit set of expectations about its future program emphases; and
6. Promote public understanding of higher education by illustrating for students, the general public, and the state officials the pattern and logic of the missions and programs of the institutions so that they may have a better basis for making choices.

MISSION STATEMENT REVISIONS

The mission and scope statement was revised (minor) in 1982 and 1983. The current official statement is the 1983 version. It consists of a one page description of each university that includes: type of institution, degree levels offered, enrollment limits, physical plant, continuing education responsibilities, and academic degree programs (selected for emphasis).

In 1983 a fundamentally new process was begun to revise the mission and scope statements. The Academic Affairs Council (Academic Vice Presidents of each university and Academic Affairs Director of ABOR staff), in assisting the Council of Presidents (which had been asked by the Board of Regents), in reviewing the Mission and Scope Statements, identified nine issues for further consideration.

In May 1984 the universities expressed concern about the Board staff's proposed identification of program areas in which the university would develop nationally recognized programs. It was suggested that the identification of specific program areas may be more acceptable in the annual work plan instead of in the Statewide Plan for the University System. Also discussed was program duplication, the need for distinctive missions for each university, the cost of developing nationally recognized programs, and the effect of the identification of specific programs on the morale of faculty in other areas. Initial goals (statewide) were developed by the Board staff and the universities. The procedure was to have the Board staff identify policy issues and discuss them at the February 1985 Board meeting. The actual revised mission and scope statement, and university goals, were submitted in Fall 1985 (in three parts to include Mission and Scope, College Plans, and non-college plans.

Also in 1984, the Academic Affairs Council developed a draft "Arizona University System Statewide Plan 1985-1990". While this draft was never finalized, it formed the basis for revisions in 1986 by the Academic Affairs Council, which also remained in draft. The sections included assumptions, goals, access, response to state needs, diversity (of role, mission, scope), and accountability.

MISSIONS AND PRIORITIES SURVEY

In 1984, a research report titled "Missions and Priorities of Arizona Universities" was developed by Richard Richardson et al. at Arizona State University (at the suggestion originally of the Arizona Academy). A grouping of 10 missions and priorities was developed by surveying legislators, voters, Regents, Academy members, faculty, and administrators. A 66 item questionnaire was summarized by grouping the responses into 10 mission components.

These are listed in priority order:

1. Teaching Programs and Services
2. Educational and Cultural Services
3. Research and Technical Assistance
4. Health Care for Teaching and Research
5. Improving Quality
6. Student Support Services
7. Broadening Access
8. Optimizing Revenues
9. Emphasizing Minorities and Women
10. Intercollegiate Athletics

Each of these mission components is accompanied by 2-10 specific suggestions.

During FY 86 and FY 87 the Academic Affairs Council developed a series of Issues Facing the Three Universities 1986-2000. These included assumptions for external and internal changes, allocation of resources across instruction, research, and public service (needs/demands/important choices), delivery systems (personnel/facilities/-important choices), and conclusions.

The Academic Affairs Council also identified external driving forces for changes (demographic, social and political, technological, economic, cultural, and education) and internal driving forces (development of knowledge, dissemination of knowledge, resource development and limitations, and management and administration).[17]

FUTURE NEEDS OF THE STATE COMMITTEES

In FY 86 the ABOR established a Future Needs of the State Committee that identified three subcommittees; the subcommittees and a brief description of activities are[18]:

- Education and Public Expectations (Trends and Enrollments: Projections for Arizona's Universities to the Year 2000.

  Identification of five trends (with indicators, public expectations, and emerging issues for each): heightened concern about undergraduate program quality, widespread concerns about faculty, concerns about student access and retention, national concerns about legislative bodies and executive groups establishing university policy. In addition, enrollment projections were made to the year 2000, including assumptions and past trends.

- Government, Budgetary and Natural Resources Considerations

  Summarized three major areas: The Political Environment of the 1990s: The Post-Reagan Era (key features of Arizona's higher education policy system, major change factors in the policy system, opportunities and constraints for higher education); A Closer Look at Financial Resources for Higher Education (the federal role, state revenues and appropriations, tuition and fee revenue, other non-governmental revenues); and Natural Resources and Environmental Considerations (resources availability, environmental quality, natural resource-based industries, opportunities for the universities).

- Economic, Demographic and Manpower.

  Summary includes: Arizona has become one of the fastest growing states in the nation in terms of population, employment, and income, and this growth seems destined to continue to 2000; population inflows to Arizona are influenced by the business cycle, including more rapid employment contraction than the economy as a whole; the Arizona economy is changing with a decline in agriculture, mining, construction, and government.

In addition, the Future Needs of the State committee developed special papers on Financing Issues Facing the Three Arizona Public Universities 1985-2000 (ABOR Finance Council), The Quality of Academic Programs (Academic Affairs Committee), and Access to the Arizona University System (Committee with representation from each university).

Finally, the Budget Cost Study[19] took a significant amount of time and caused delays in the planning process. In May 1987 an Associate Director (ABOR staff) was hired and the strategic planning process began again.

ENDNOTES

1. There are several Board of Regents' (ABOR) activities underway concurrent with the study by the Task Force. This is especially true with the strategic planning area, possibly causing some of the statements made in this working paper to not reflect the current situation.

2. For a brief description of how the universities are in transition see the Background section of this report Universities in Transition.

3. For a more detailed discussion, see the Working Paper "Future Changes: Implications for Arizona Universities."

4. For more detailed information see the Working Paper "Competitive Advantage of Higher Education in Arizona, Viewed in a National Perspective."

5. See the Task Force Working Paper "Future Changes: Implications for Arizona Universities" for a more detailed discussion.

6. More recently, there has been questioning among the universities and the ABOR staff as to the purpose and content of a "statewide" (ABOR) mission statement in addition to those of the universities; very recently (end of June 1988), this aspect of the process seems to be resolved and is nearly ready for discussion by the Board of Regents.

7. See Mission Statement Guidelines in Part II of this document for examples of mission statement content.

8. These reports were identified by the universities for inclusion in this listing.

9. These joint efforts also involved the ABOR staff.

10. The Strategic Planning Council consists of representatives of each university and the Board staff. Meetings have been held biweekly to develop statewide mission statement and strategic directions. The process is relatively recent (April through June 1988 and continues).

11. The results of these subcommittees are summarized in the Working Paper "Future Changes: Implications for Arizona Universities," June 1988.

12. The strategic planning process and its products are currently undergoing change. What is written here has evolved since February 1988 and further changes should be expected.

13. Several recommendations presented here are currently being acted upon by the ABOR. They are listed because during the Task Force analysis the issues arose.

These ABOR initiated changes during the Task Force study time period are particularly important in the strategic planning area because of the amount of ABOR staff activities.

These recommendations include issues relating to strategic planning, but also include data and analysis oriented recommendations, because of the relevance to the planning process.

14. A more detailed discussion of the changes in Arizona universities is in the Working Paper "Arizona Universities in Transition."

15. The diversity and total programs available in the Arizona universities is found in the "Academic Degree Program Inventory and Planning Document" maintained by the Board of Regents. It is the basic document that lists approved programs or authority to plan new programs. It covers 36 major categories, and involves (about) 300 departments/programs among the three universities. The most recent revision is June 1988.

16. Taken from George Keller, Academic Strategy (see references).

17. For a listing of these driving forces, see the Working Paper "Future Changes: Implications for Arizona Universities."

18. For more details, see Working Paper " Future Changes: Implications for Arizona Universities."

19. The Budget Study was conducted by the ABOR, in cooperation with the Arizona Legislature, during FY 87. It study "examined the degree of congruence between the level of funding for each university and the size and academic mission of that university"; it covered the three year period FY 84-86.

ARIZONA UNIVERSITIES PROGRAM CHANGES NINE YEAR SUMMARY: 1981-1989

ROGER L. CALDWELL

INTRODUCTION

The mechanism for developing new programs or significantly augmenting existing programs is referred to as "program changes" (formerly "decision packages"). This funding mechanism is separate from the continuing budget. The purpose of this analysis was to determine how the universities choose to emphasize new or expanded programs. This material identifies areas of institutional focus as an aid in the development of institutional mission statements.

METHOD

University requests for program changes for FY 81 to FY 89 were obtained from the Arizona Board of Regents'(ABOR) office and individual university files. The following information was obtained for each program request: university priority ranking, full time equivalent personnel (FTE), funding, and title. Additional information was added for total number of submissions by the universities to ABOR, and total ABOR approved submissions by the universities to the legislature.

Each program request was assigned one of 17 subject keywords (Table 1). This keyword selection was based on the request title and on occasion the funding portion of the budget (e.g., to determine academic vs administrative staff; where there were overlaps between key words, the most representative key was selected. These subject keys are related to the type of request, and have nothing to do with the source of funding or the organizational structure of the universities.

Legislative appropriation totals for funded program changes were obtained from the Joint Legislative Budget Committee, and confirmed or revised by each university for the relevant approvals. All requests made by the universities are included in this analysis, including multiple year submissions as multiple entries. Several budget requests have been modified to reflect branch campus establishment. ASU West Campus did not have a separate budget until FY 85; those requests for the West campus, while it was still in the ASU budget, have been removed from ASU in these summaries and listed under ASUZ, to indicate they were early indicators of the branch campus (there are two). The College of Medicine at the University of Arizona is listed separately as UOAM.

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CAUTIONS

There are qualifications on the use of these data (see Appendix A for a detailed explanation). Changes in procedures relating to guidelines and reporting of approved funding have occurred over the years, transfers between or among the universities and state agencies have taken place, and special funding has been provided outside the program change process. Therefore, the results listed here must be qualified by the statements in Appendix A, and should not be interpreted for any meaning beyond what is intended in this analysis.

SUMMARY

During this nine-year period, there were 716 requests by the universities to the ABOR for $282.5 million. The legislature approved 222 of these requests for $83.0 million; this funding amount represents 29.4 percent of the originally submitted requests from the universities to the ABOR.

The major focal areas of the universities, as identified by program change requests over the nine-year period are:

ABOR

Beginning in FY 86 the ABOR staff requested program change funding, using the same guideline percentages as the universities, but has not received any funding through this mechanism.

ASU

Three subject areas account for 41 percent of all university requests:academic staff, engineering, and administrative staff.

ASUW

ASU West began as a separate budget in FY 85; all university requests consist of infrastructure subjects (academic and administrative staff, building support, and computing).

NAU

Three subject areas account for 46 percent of all university requests: academic staff, computing, and general undergraduate.

UA

Three subject areas account for 58 percent of all university requests: biological sciences, physical sciences, and engineering.

UAM

The University of Arizona College of Medicine is budgeted and analyzed separately. All entries for program changes are listed as "medical" and this term is reserved for the College of Medicine (the "biological sciences" subject does not apply to the College of Medicine).

RESULTS

Specific results are summarized in the following tables and are attached to this report:

Table 1.	Description of 17 Subject Headings
Table 2.	Program Changes by Subject, All Universities
Table 3.	Program Changes by Year, All Universities

Table 4. Program Changes by Subject, Individual Universities

Table 5. Program Changes by Year, Individual Universities

Table 6. Program Changes by Year, Individual Subjects

Table 7. Program Changes by University, Individual Subjects

Table 8. Program Changes by Subject, Individual Years

Table 9. Program Changes Approved, by Subject, Individual Universities

Table 10. Program Changes Summary by Subject

Table 11. Program Summary by Overall University Distribution

CONCLUSIONS

1. The program change requests are an effective way to identify how university priorities are linked to budget actions (but there are also other methods of funding university priorities).

2. A focus on specific subjects by each university is very clear. The program change requests indicate the universities are different in programs leading to mission orientation and in their degree of transformation over the nine-year period. These differences are based partly on the history of the university, the rate of change of the campus as it moves to new activities, and perceived future directions by the university administration for the years ahead. [See Tables 7 and 9].

3. The large number of infrastructure requests (e.g., academic staff, administrative staff, building support) for some universities reflects a maturation process (requiring increased infrastructure). This need causes fewer program change requests to be allocated to specific academic program development. [See Tables 3, 4, and 10].

4. The three infrastructure subjects (academic staff, administrative staff, building support) account for 30 percent of the Arizona university REQUESTS (43 percent for ASU, 88 percent for ASUW, 32 percent for NAU, and 12 percent for UOA exclusive of the College of Medicine). These three subjects account for 32 percent of all program change APPROVALS (39 percent for ASU, 99 percent for ASUW, 25 percent for NAU, and 8 percent for UOA exclusive of the College of Medicine). [See Tables 4 and 7].

5. The relative emphasis on program change subjects has varied over the nine-year period. Those subjects with more than 50 percent of the total requests in the two year period of FY 87 and FY 88 include: biological sciences, business, education, general undergraduate, humanities and social science, medicine, and other. Overall, the greatest dollar emphasis for requests has been on academic staff and engineering; the lowest emphasis on education (as a college) and public service. [See Tables 6, 7 and 8].

6. The average size of a university request has increased ($75,779 in FY 81 to $645,234 in FY 89) as has the average size of the approved programs ($80,107 in FY 81 to $507,076 in FY 89). This partly reflects inflation (the GNP deflator index changed from 89.9 in FY 81 to 118.9 in FY 88) but is primarily due to real increases in request size. [See Tables 3 and 6].

7. The University of Arizona generally submits a greater number of requests but within the same guideline values designated by the ABOR (nine-year totals of 331 for UOA, of 158 for ASU, 12 for ASUW and of 116 for NAU). [See Tables 5 and 7].

8. The actual range of approved to submitted varies by year and by university. Over the nine-year period, 28-31 percent of the dollar values of submissions were approved (the range represents the three universities' experiences). Individual years ranged from 0 to 80 percent, with approvals frequently in the range of 40-60 percent. The ratio of funding (actual dollars) among the universities also varies widely on an annual basis, but over the nine-year period was 2.9/2.9/1.0 for ASU/UA/NAU. Note especially the limitations listed in Appendix A as a caution to using these numbers. [See Table 11].

9. The program change mechanism is an effective way to build existing or new programs within the universities. There are very few changes to university submissions or priorities by either the ABOR or the legislature (nine-year totals are 120 of 716 requests or 9.2 percent of the original request amounts by the universities to the ABOR were changed either by the ABOR or the legislature. This represents 16.8 percent of the number of proposals. These include two requests initiated by the ABOR and two requests added by the legislature.

10. University guidance to administrative units for program change submissions varies widely, from no counsel to required linking with university goals.

RECOMMENDATIONS

- THE BOARD OF REGENTS SHOULD PROVIDE REALISTIC AND CLEARLY STATED GUIDELINES TO THE UNIVERSITIES FOR PROGRAM CHANGE SUBMISSIONS.

Consideration should be given to differential guidelines as a percentage of the expenditure authority (or some analogous approach) but they should be based on results of a strategic planning process. This would reduce the need for "equity" analyses in the future, and would help compensate for infrastructure oriented program changes. These guidelines should be thoughtfully developed with consistent format and content.

- THE BOARD OF REGENTS SHOULD IDENTIFY STATEWIDE GOALS AND RECOMMEND THE DEGREE TO WHICH THE UNIVERSITIES SHOULD RESPOND TO THOSE GOALS OR STRATEGIC DIRECTIONS

The Regents may develop "state oriented" goals that may not be the same as those identified by the universities for a given year. The Board should make it clear to what degree the universities are expected to respond to those goals. This could take the form of a narrative guidance, a percentage of funds target, or specific program recommendations.

- THE UNIVERSITIES SHOULD BE MORE EFFICIENT IN PROCESSING PROGRAM CHANGE REQUESTS.

Requests that are solicited by the university administration that have no realistic funding potential only cause anxiety among those making the original submissions. The university administration should provide guidance to those submitting program change requests so that focus is given to program change requests in those areas of strategic choice or institutional weakness.

- THE BOARD SHOULD CONSIDER REVISING SLIGHTLY THE PROGRAM CHANGE (NEW ACTIVITIES) PORTION OF THE BUDGET PROCESS.

The program change portion of the annual budget process is the most likely mechanism to effect strategic choices. While the process functions well, efficiency could be improved by considering the following options:

a) reducing the number of program change requests submitted by the university to be more in line with expected approvals,

b) allow differential funding of program changes for the three universities, based on the strategic plans, for one to three-year time frames,

c) ABOR prioritizing all university requests into a single listing to address strategic issues and identified needs. Care must be taken to allow "targets of opportunity" that may fit within the mission but are not focused in the current strategic choices, so the universities are not precluded from making rapid changes when necessary.

APPENDIX A

DISCUSSION OF THE ANALYTICAL METHOD AND RELATED FUNDING ACTIONS

There are several situations in this report where errors surfaced during listing the program change requests. This is because of revisions in program change titles, revisions in funding or FTE for specific requests and various methods of reporting results. Each of these changes can occur at any stage of the process.

In addition, formats, completeness of information, a few combinations of several separate requests into a fewer number of approvals, and the format and content of actual approvals from the legislature vary from year to year and from institution to institution. These variations within the process required multiple reviews of the data and consultation with the universities and the Board of Regents to develop the final listing; any errors remaining are likely minor.

From FY 81 to FY 83, changes in faculty due to enrollment increases/declines were requested via program change; these requests were eliminated from this summary, so that all requests summarized reflect real priorities of the universities. From FY 86 to FY 89 the ABOR has provided guidance to the universities for the amount of request funding for program changes; this is a percent of the previous year's expenditure authority (ranges have been from 7 to 10 percent). In earlier years, informal guidelines or no specific suggestions were provided (and there were variations among the universities).

Faculty and staff transfers have also occurred outside of the formal program change process. For ASU in FY 85, 5.5 staff positions (and $292,800) were transferred to ASUW and in FY 86, 28 faculty positions were transferred. These were the result of ASUW related enrollment driven formula losses at ASU. In FY 86, 16 staff were transferred to ASU from the Arizona Department of Health Services Crippled Children's Hospital facility. For ASU in FY 84 there was a $2,112,200 and 29 FTE Engineering Excellence request originally submitted by the university as a program change; but there was no program change funding for any of the universities in that year. This was funded as a special appropriation in HB 2308. In FY 81 and FY 82 ASU received "equity" funding for 40 faculty and 20 faculty, respectively. A 1979 cost study conducted by the ABOR had determined 110 faculty should be added over three years as program change requests; these were placed as program change requests by the university but funded (partially) outside the program change process. In FY 87 ASU received a $500,000 equity adjustment. There also appears to be a tendency for ASU to request some items through the capital budget process that other universities might request through this program change process (e.g., computing equipment).

In FY 85 an enrollment formula-driven loss of 18.5 faculty at NAU was converted to staff positions (with salaries reduced to match staff salary schedules). In FY 87 the Arizona Department of Education transferred the Jobs for Arizona Graduates program to NAU, along with 20 FTE; the following year the program was removed but NAU was allowed to keep the staff positions as equity funding. In FY 87 NAU received a $250,000 equity adjustment.

In FY 89 ASU and NAU were to receive equity funding based on a Budget Cost Study,[1] with funding sequence to follow a priority of continuation budget, equity funding, program change funding; this request was never finalized or formally submitted to the legislature.
One of the seven recommendations is relevant to this program change analysis:

Future program change funds should be allocated to the institutions on the basis of informed priority judgments about the needs of the state and the university system rather than on the basis of a fixed percentage of the budget. This may cause operating budgets to grow differentially.

In FY 89 NAU had permission from ABOR to exceed the program change submission guideline to allow NAU Yuma to be added above the regular submission amounts; similar permission was granted to UOA for the Sierra Vista campus.

Several entries have incomplete data. For the years FY 87, 83, 82, and 81 there are incomplete data for FTE in the program requests and legislative approvals for the UOA; all program changes approved by the ABOR are complete with those exceptions (primarily those submitted by the university and not approved by ABOR). There are 117 requests from UOA (81 are from FY 81) and 29 from UOAM (24 are from FY 81) in this category. In addition, legislatively funded FTE for UOA and UOAM are incomplete for FY 81; the amount funded is accurate for all entries for all universities except three entries for UOA in FY 81 (request amount totals $237,074). The amounts requested are complete for all entries. Thus, the FTE amounts in the attached tables are understated for UOA and UOAM.

There are two other factors related to program change requests that are important to consider.

First, commonly the available legislative funding is matched against the priorities submitted by the universities, but often the university budgets are funded at the end of the appropriations process. Thus, the degree of program change funding ability is determined by available funds; frequently a program change request on the "border of funding" will be partially funded.

Second, program requests do not represent the only mechanism for developing new programs or enhancing old programs. The other major mechanism is internal reallocation of the continuation budget; those changes are very difficult to follow over the years (partially because of administrative reorganizations) and are not addressed in this paper.

Finally, there is a difference of four requests attributed to the universities that were added by ABOR or the legislature; these are listed in the summaries as having been submitted by the universities due to the manner in which these data were summarized.

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1. Arizona Board of Regents, Proposed Budget Study Report, February 2, 1988, 16 pages with appendices.

SUMMARY TABLES OF SPECIFIC RESULTS

Table 1. Description of 17 Subject Headings
Table 2. Program Changes by Subject, All Universities
Table 3. Program Changes by Year, All Universities
Table 4. Program Changes by Subject, Individual Universities
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Table 1. Subject Descriptions

Subject	Descriptions
Academic/Staff	Primarily staff positions academic units, including libraries, but also includes non-personnel expenditures
Administration/Staff	Primarily staff positions in administrative units, but also includes non-staff
Biological Sciences	Biology and agriculture, including the Agricultural Experiment Station (does not include College of Medicine)
Building Support	Primarily maintenance for new buildings
Business	Academic business and management programs
Computing(Non-Dept)	General university computing and telecommunications; does not contain requests specific to academic departments
Education	Academic College of Education programs; does not include off-campus instruction or general undergraduate (those are in other subject areas)
Engineering	Academic engineering programs
General Undergraduate	General undergraduate, primarily math and english programs
Humanities/Social Science	Academic programs in humanities and social science disciplines
Medical	College of Medicine entries (exclusively)
Off Campus Instruction	Specific programs for off-campus instruction
Organized Research	Programs not identified by discipline but clearly organized research
Other (Misc)	Subjects that are not clearly in another subject area
Physical Sciences	Chemistry, physics, mathematics, geology, astronomy, and other physical science academic programs
Public Service	Clear public service oriented subjects, includes Cooperative Extension Service
Student Services	Non-academic student support, such as recruitment, advising, financial aid

6/27/88

Program Change Subject Summary
Nine Year Summary FY 81-89
Table 2

Subject	Count	Rqst Total	Appr Total	Rqst FTE	Appr FTE
Academic/Staff	92	42,430,996	12,983,800	917.1	412.0
Administration/Staff	74	28,129,862	6,091,000	941.4	201.7
Biological Sciences	78	27,353,504	7,425,900	438.5	115.8
Building Support	38	14,470,085	7,288,109	365.0	244.9
Business	16	6,893,688	3,746,900	112.9	71.3
Computing(Non-Dept)	41	24,699,233	6,565,300	316.7	66.5
Education	4	1,841,521	400,000	45.6	13.0
Engineering	59	40,028,026	18,825,107	513.9	269.2
General Undergraduate	27	16,128,058	3,060,200	401.5	94.7
Humanities/Social Science	52	15,780,797	1,524,000	337.0	45.4
Medical	82	17,678,477	3,120,900	317.5	74.6
Off Campus Instruction	10	5,485,801	3,092,600	93.7	75.0
Organized Research	15	3,687,170	818,000	92.4	30.1
Other (Misc)	6	2,319,800	816,600	33.0	3.0
Physical Sciences	56	22,517,211	4,691,200	340.4	82.7
Public Service	17	2,049,014	357,300	29.1	10.5
Student Services	49	11,005,167	2,206,300	467.8	99.9
Totals:	716	282,498,410	83,013,216	5763	1910

Note: Requests are included for ABOR staff, ASU, ASUW, NAU, NAYuma, UOA,

6/27/88

Program Changes FY by University
Table 3

Year	University Request	University Request	Legislature Approved	Request	Approved	Average Approved
University	Count	Total	Total	FTE	FTE	Total
FY 1989						
ABOR	5	498,600	0	6.0	0.0	
ASU	28	20,233,000	3,548,500	512.7	103.0	443,563
ASUW	6	5,746,400	2,781,200	45.0	38.0	695,300
NAU	10	8,300,000	1,932,200	145.1	61.5	644,067
UOA	38	21,669,800	3,578,916	367.9	54.9	511,274
UOAM	7	4,204,700	329,000	66.2	9.0	164,500
Total:	94	60,652,500	12,169,816	1142.9	266.4	507,076
FY 1988						
ABOR	5	62,100	0	5.0	0.0	
ASU	24	22,368,300	2,604,400	579.5	69.2	868,133
ASUW	3	6,126,500	1,757,500	104.0	64.0	878,750
NAU	15	7,600,000	419,500	158.1	3.0	69,917
UOA	40	24,831,600	1,702,300	412.1	40.0	567,433
UOAM	12	4,480,900	133,700	82.1	5.0	133,700
Total:	99	65,469,400	6,617,400	1340.8	181.2	441,160
FY 1987						
ABOR	4	388,100	0	0.0	0.0	0
ASU	22	16,340,800	7,242,500	438.1	185.8	402,361
ASUW	1	1,000,000	620,900	53.4	29.1	620,900
NAU	16	5,700,000	2,202,300	125.0	59.8	137,644
UOA	27	18,798,100	7,201,600	267.1	112.5	654,691
UOAM	6	2,888,200	1,038,800	51.1	15.5	519,400
Total:	76	45,115,200	18,306,100	934.7	402.7	373,594
FY 1986						
ABOR	1	50,000	0	0.0	0.0	
ASU	12	10,777,200	5,136,900	273.5	152.0	2,568,450
ASUW	1	2,672,600	2,525,600	0.0	53.4	2,525,600
NAU	12	3,555,000	1,715,900	85.6	45.0	245,129
UOA	22	11,815,300	5,954,200	188.0	106.3	496,183
UOAM	7	1,703,400	524,800	33.9	10.8	262,400
Total:	55	30,573,500	15,857,400	581.0	367.5	660,725

Table 3

Year	University Request	University Request	Legislature Approved	Request	Approved	Average Approved
University	Count	Total	Total	FTE	FTE	Total
FY 1985						
ASU	4	7,919,800	3,206,100	202.0	72.0	1,603,050
ASUW	1	1,875,600	1,622,800	43.5	38.5	1,622,800
NAU	7	1,775,000	1,961,000	40.0	60.0	280,143
UOA	20	7,537,700	5,986,600	160.1	127.4	399,107
UOAM	7	1,274,300	0	32.2	0.0	0
Total:	39	20,382,400	12,776,500	477.8	297.9	491,404
FY 1984						
ASU	5	4,945,400	0	66.5	0.0	
NAU	9	1,217,000	0	49.5	0.0	
UOA	11	4,154,200	0	75.9	0.0	
UOAM	3	644,300	0	15.6	0.0	0
Total:	28	10,960,900	0	207.5	0.0	0
FY 1983						
ASU	8	8,418,100	5,050,200	109.5	22.0	5,050,200
NAU	21	3,513,000	686,600	81.0	10.5	228,867
UOA	42	7,292,497	1,212,800	146.3	31.7	173,257
UOAM	9	1,068,016	508,600	21.3	17.0	169,533
Total:	80	20,291,613	7,458,200	358.1	81.2	532,729
FY 1982						
ASU	25	10,429,400	2,073,400	356.9	100.0	129,588
ASUZ	1	170,000	0	3.4	0.0	
NAU	13	1,096,500	801,300	36.0	27.0	100,163
UOA	45	5,103,718	2,292,200	95.6	65.6	143,263
UOAM	7	582,970	335,100	15.1	9.8	111,700
Total:	91	17,382,588	5,502,000	507.0	202.4	127,953
FY 1981						
ASU	30	5,582,797	1,260,600	163.8	52.0	157,575
ASUZ	1	314,378	277,100	7.0	5.0	277,100
NAU	13	957,000	712,100	42.9	39.0	79,122
UOA	86	3,984,443	1,825,100	0.0	7.5	60,837
UOAM	24	831,691	250,900	0.0	7.5	41,817
Total:	154	11,670,309	4,325,800	213.7	111.0	80,107
Sum:	716	282,498,410	83,013,216	5763.4	1910.3	332,053

6/27/88

Program Changes by Subject/University
Table 4

Subject University	University Request Count	University Request Total	Legislative Approved Total	Rqst FTE	Approved FTE	Average Approved
Academic/Staff						
ASU	38	22,437,278	6,018,600	579.3	193.0	462,969
ASUW	5	9,114,500	5,185,300	142.9	137.0	1,296,325
ASUZ	1	170,000	0	3.4	0.0	
NAU	24	6,360,300	1,442,100	144.5	70.0	103,007
UOA	24	4,348,918	337,800	47.0	12.0	56,300
Total:	92	42,430,996	12,983,800	917.1	412.0	350,914
Administration/Staff						
ABOR	9	581,300	0	11.0	0.0	0
ASU	20	18,281,878	2,709,800	642.4	91.0	541,960
ASUW	1	2,981,600	2,033,400	30.0	30.0	2,033,400
NAU	20	2,487,700	387,200	130.3	28.5	77,440
UOA	24	3,797,384	960,600	127.7	52.2	192,120
Total:	74	28,129,862	6,091,000	941.4	201.7	358,294
Biological Sciences						
ASU	1	1,025,800	0	18.0	0.0	
NAU	4	998,000	739,800	20.0	19.0	184,950
UOA	73	25,329,704	6,686,100	400.5	96.8	318,386
Total:	78	27,353,504	7,425,900	438.5	115.8	297,036
Building Support						
ASU	9	5,349,050	3,086,500	175.0	130.5	440,929
ASUW	4	3,214,200	2,089,300	59.0	56.0	522,325
NAU	10	1,839,500	835,000	61.5	17.0	167,000
UOA	15	4,067,335	1,277,309	69.5	41.4	255,462
Total:	38	14,470,085	7,288,109	365.0	244.9	347,053
Business						
ASU	2	2,497,200	2,437,200	51.0	51.0	1,218,600
NAU	6	1,401,000	659,300	26.9	11.3	164,825
UOA	8	2,995,488	650,400	35.0	9.0	162,600
Total:	16	6,893,688	3,746,900	112.9	71.3	374,690

Table 4

Subject University	University Request Count	University Request Total	Legislative Approved Total	Rqst FTE	Approved FTE	Average Approved
Computing(Non-Dept)						
ABOR	1	32,500	0	0.0	0.0	
ASU	9	7,181,516	269,000	105.8	5.0	134,500
ASUW	2	2,110,800	0	14.0	0.0	
NAU	11	5,713,200	1,484,900	98.0	32.0	247,483
UOA	18	9,661,217	4,811,400	98.9	29.5	601,425
Total:	41	24,699,233	6,565,300	316.7	66.5	410,331
Education						
ASU	1	871,800	0	24.0	0.0	
NAU	1	500,000	400,000	13.0	13.0	400,000
UOA	2	469,721	0	8.6	0.0	
Total:	4	1,841,521	400,000	45.6	13.0	400,000
Engineering						
ASU	14	21,489,796	12,830,100	289.8	181.0	1,283,010
NAU	4	2,895,000	0	35.0	0.0	0
UOA	41	15,643,230	5,995,007	189.1	88.2	352,647
Total:	59	40,028,026	18,825,107	513.9	269.2	649,142
General Undergraduate						
ABOR	1	150,000	0	0.0	0.0	
ASU	8	7,725,200	615,800	200.0	19.0	307,900
NAU	8	3,303,500	233,500	70.0	0.0	77,833
UOA	10	4,949,358	2,210,900	131.5	75.7	1,105,450
Total:	27	16,128,058	3,060,200	401.5	94.7	437,171
Humanities/Social Science						
ASU	15	7,302,800	334,700	170.0	20.0	83,675
NAU	3	406,000	0	4.0	0.0	
UOA	34	8,071,997	1,189,300	163.0	25.4	132,144
Total:	52	15,780,797	1,524,000	337.0	45.4	117,231
Medical						
UOAM	82	17,678,477	3,120,900	317.5	74.6	148,614
Total:	82	17,678,477	3,120,900	317.5	74.6	148,614

Table 4

Subject University	University Request Count	University Request Total	Legislative Approved Total	Rqst FTE	Approved FTE	Average Approved
Off Campus Instruction						
ASU	2	1,314,323	0	21.0	0.0	
ASUZ	1	314,378	277,100	7.0	5.0	277,100
NAU	5	3,185,000	2,278,000	47.0	59.0	569,500
UOA	2	672,100	537,500	18.7	11.0	537,500
Total:	10	5,485,801	3,092,600	93.7	75.0	515,433
Organized Research						
ASU	8	2,393,058	517,000	78.9	21.6	258,500
NAU	2	1,133,000	229,400	13.5	8.5	114,700
UOA	5	161,112	71,600	0.0	0.0	35,800
Total:	15	3,687,170	818,000	92.4	30.1	136,333
Other (Misc)						
ABOR	1	20,000	0	0.0	0.0	
ASU	1	1,073,300	0	27.0	0.0	
NAU	4	1,226,500	816,600	6.0	3.0	272,200
Total:	6	2,319,800	816,600	33.0	3.0	272,200
Physical Sciences						
ASU	3	2,072,000	466,800	36.5	7.5	466,800
UOA	53	20,445,211	4,224,400	303.9	75.2	281,627
Total:	56	22,517,211	4,691,200	340.4	82.7	293,200
Public Service						
ASU	3	105,833	0	1.0	0.0	0
UOA	14	1,943,181	357,300	28.1	10.5	71,460
Total:	17	2,049,014	357,300	29.1	10.5	59,550
Student Services						
ABOR	3	215,000	0	0.0	0.0	
ASU	24	5,893,965	837,100	282.8	36.4	93,011
NAU	14	2,264,800	925,100	93.5	44.5	154,183
UOA	8	2,631,402	444,100	91.5	19.0	444,100
Total:	49	11,005,167	2,206,300	467.8	99.9	137,894
Sum:	716	282,498,410	83,013,216	5763.4	1910.3	332,053

6/27/88 Program Changes University/Year

Table 5

University Year	University Request Count	University Request Total	Legislative Approved Total	Rqst FTE	Approved FTE	Average Approved
ABOR						
FY 1989	5	498,600	0	6.0	0.0	
FY 1988	5	62,100	0	5.0	0.0	
FY 1987	4	388,100	0	0.0	0.0	0
FY 1986	1	50,000	0	0.0	0.0	
Total:	15	998,800	0	11.0	0.0	0
ASU						
FY 1989	28	20,233,000	3,548,500	512.7	103.0	443,563
FY 1988	24	22,368,300	2,604,400	579.5	69.2	868,133
FY 1987	22	16,340,800	7,242,500	438.1	185.8	402,361
FY 1986	12	10,777,200	5,136,900	273.5	152.0	2,568,450
FY 1985	4	7,919,800	3,206,100	202.0	72.0	1,603,050
FY 1984	5	4,945,400	0	66.5	0.0	
FY 1983	8	8,418,100	5,050,200	109.5	22.0	5,050,200
FY 1982	25	10,429,400	2,073,400	356.9	100.0	129,588
FY 1981	30	5,582,797	1,260,600	163.8	52.0	157,575
Total:	158	107,014,797	30,122,600	2702.5	756.0	519,355
ASUW						
FY 1989	6	5,746,400	2,781,200	45.0	38.0	695,300
FY 1988	3	6,126,500	1,757,500	104.0	64.0	878,750
FY 1987	1	1,000,000	620,900	53.4	29.1	620,900
FY 1986	1	2,672,600	2,525,600	0.0	53.4	2,525,600
FY 1985	1	1,875,600	1,622,800	43.5	38.5	1,622,800
Total:	12	17,421,100	9,308,000	245.9	223.0	1,034,222
ASUZ						
FY 1982	1	170,000	0	3.4	0.0	
FY 1981	1	314,378	277,100	7.0	5.0	277,100
Total:	2	484,378	277,100	10.4	5.0	277,100

Table 5

University Year	University Request Count	University Request Total	Legislative Approved Total	Rqst FTE	Approved FTE	Average Approved
NAU						
FY 1989	10	8,300,000	1,932,200	145.1	61.5	644,067
FY 1988	15	7,600,000	419,500	158.1	3.0	69,917
FY 1987	16	5,700,000	2,202,300	125.0	59.8	137,644
FY 1986	12	3,555,000	1,715,900	85.6	45.0	245,129
FY 1985	7	1,775,000	1,961,000	40.0	60.0	280,143
FY 1984	9	1,217,000	0	49.5	0.0	
FY 1983	21	3,513,000	686,600	81.0	10.5	228,867
FY 1982	13	1,096,500	801,300	36.0	27.0	100,163
FY 1981	13	957,000	712,100	42.9	39.0	79,122
Total:	116	33,713,500	10,430,900	763.1	305.8	176,795
UOA						
FY 1989	38	21,669,800	3,578,916	367.9	54.9	511,274
FY 1988	40	24,831,600	1,702,300	412.1	40.0	567,433
FY 1987	27	18,798,100	7,201,600	267.1	112.5	654,691
FY 1986	22	11,815,300	5,954,200	188.0	106.3	496,183
FY 1985	20	7,537,700	5,986,600	160.1	127.4	399,107
FY 1984	11	4,154,200	0	75.9	0.0	
FY 1983	42	7,292,497	1,212,800	146.3	31.7	173,257
FY 1982	45	5,103,718	2,292,200	95.6	65.6	143,263
FY 1981	86	3,984,443	1,825,100	0.0	7.5	60,837
Total:	331	105,187,358	29,753,716	1713.0	545.9	294,591
UOAM						
FY 1989	7	4,204,700	329,000	66.2	9.0	164,500
FY 1988	12	4,480,900	133,700	82.1	5.0	133,700
FY 1987	6	2,888,200	1,038,800	51.1	15.5	519,400
FY 1986	7	1,703,400	524,800	33.9	10.8	262,400
FY 1985	7	1,274,300	0	32.2	0.0	0
FY 1984	3	644,300	0	15.6	0.0	0
FY 1983	9	1,068,016	508,600	21.3	17.0	169,533
FY 1982	7	582,970	335,100	15.1	9.8	111,700
FY 1981	24	831,691	250,900	0.0	7.5	41,817
Total:	82	17,678,477	3,120,900	317.5	74.6	148,614
Sum:	716	282,498,410	83,013,216	5763.4	1910.3	332,053

6/27/88

Program Changes FY by Subject
Table 6

Year/Subject	University Request Count	University Request Total	Legislature Approved Total	Request FTE	Approved FTE
FY 1989					
Academic/Staff	6	6,516,300	700,000	70.0	27.5
Administration/Staff	10	6,435,100	2,033,400	119.5	30.0
Biological Sciences	12	6,314,000	0	124.0	0.0
Building Support	8	3,846,400	2,219,409	86.4	67.4
Business	3	1,004,200	0	19.8	0.0
Computing(Non-Dept)	3	3,645,300	542,200	68.0	18.0
Education	1	871,800	0	24.0	0.0
Engineering	13	9,442,700	4,546,107	115.0	56.5
General Undergraduate	5	3,965,600	0	98.6	0.0
Humanities/Social Science	10	4,437,600	364,700	116.5	20.0
Medical	7	4,204,700	329,000	66.2	9.0
Off Campus Instruction	2	2,052,600	1,227,500	31.0	27.0
Organized Research	1	373,400	0	10.0	0.0
Physical Sciences	6	3,847,800	0	54.5	0.0
Student Services	7	3,695,000	207,500	139.4	11.0
Total:	94	60,652,500	12,169,816	1142.8	266.4
FY 1988					
Academic/Staff	8	12,312,200	416,000	274.0	16.0
Administration/Staff	9	3,410,300	0	123.0	0.0
Biological Sciences	13	7,651,800	804,100	136.4	10.5
Building Support	3	2,894,300	1,341,500	70.6	48.0
Business	4	2,767,100	1,895,000	57.6	40.0
Computing(Non-Dept)	8	8,314,500	319,500	119.2	3.0
Education	1	425,600	0	8.6	0.0
Engineering	8	5,264,200	709,400	82.3	29.2
General Undergraduate	8	7,110,800	914,700	172.0	25.5
Humanities/Social Science	10	4,859,100	0	101.5	0.0
Medical	12	4,480,900	133,700	82.1	5.0
Off Campus Instruction	1	219,500	0	3.7	0.0
Organized Research	1	360,400	0	10.5	0.0
Other (Misc)	2	270,000	0	4.0	0.0
Physical Sciences	7	4,276,600	83,500	61.5	4.0
Student Services	4	852,100	0	33.8	0.0
Total:	99	65,469,400	6,617,400	1340.8	181.2

Table 6

Year/Subject	University Request Count	University Request Total	Legislature Approved Total	Request FTE	Approved FTE
FY 1987					
Academic/Staff	7	4,411,800	1,934,600	127.4	69.1
Administration/Staff	10	7,964,800	2,503,000	273.6	81.0
Biological Sciences	8	4,017,900	2,152,600	53.3	33.3
Building Support	3	727,800	155,000	28.1	9.0
Business	4	1,866,700	706,900	21.0	16.8
Computing(Non-Dept)	5	4,120,900	2,547,100	27.0	15.0
Engineering	5	4,398,100	1,495,400	52.7	19.3
General Undergraduate	4	2,450,500	2,012,000	77.2	69.2
Humanities/Social Science	6	3,844,800	221,000	65.0	6.0
Medical	6	2,888,200	1,038,800	51.1	15.5
Off Campus Instruction	2	1,128,200	294,400	33.0	13.0
Organized Research	1	234,200	0	7.0	0.0
Other (Misc)	1	950,000	697,200	0.0	0.0
Physical Sciences	9	5,244,900	2,000,000	84.3	30.5
Public Service	1	257,800	226,000	7.0	7.0
Student Services	4	608,600	322,100	27.0	18.0
Total:	76	45,115,200	18,306,100	934.7	402.7
FY 1986					
Academic/Staff	7	7,457,700	5,865,800	124.5	130.9
Administration/Staff	3	1,262,800	181,400	23.8	4.5
Biological Sciences	4	1,985,500	1,219,000	35.8	14.8
Building Support	2	2,436,600	2,134,200	92.0	92.0
Business	2	908,900	867,000	14.5	14.5
Computing(Non-Dept)	5	3,235,600	1,443,700	38.5	7.5
Education	1	500,000	400,000	13.0	13.0
Engineering	4	2,771,000	1,087,500	31.8	18.8
General Undergraduate	1	351,100	0	4.0	0.0
Humanities/Social Science	4	1,211,900	430,700	21.4	7.0
Medical	7	1,703,400	524,800	33.9	10.8
Organized Research	1	360,000	156,400	10.0	5.0
Other (Misc)	1	0	100,000	0.0	2.0
Physical Sciences	5	3,298,100	639,900	36.2	11.2
Public Service	1	217,000	0	7.0	0.0
Student Services	7	2,873,900	807,000	94.6	35.5
Total:	55	30,573,500	15,857,400	581.0	367.5

Table 6

Year/Subject	University Request Count	University Request Total	Legislature Approved Total	Request FTE	Approved FTE
FY 1985					
Academic/Staff	2	2,098,600	1,845,800	53.5	48.5
Administration/Staff	5	3,327,500	716,000	150.5	37.5
Biological Sciences	4	2,031,300	1,518,000	27.7	20.9
Building Support	1	160,000	160,000	8.0	8.0
Computing(Non-Dept)	2	1,455,200	1,054,700	14.0	14.0
Engineering	6	5,438,600	4,473,500	96.0	96.0
General Undergraduate	1	190,700	0	6.0	0.0
Humanities/Social Science	2	452,800	327,800	14.7	9.0
Medical	7	1,274,300	0	32.2	0.0
Off Campus Instruction	1	414,000	1,000,000	3.0	23.0
Other (Misc)	1	1,073,300	0	27.0	0.0
Physical Sciences	5	1,768,700	1,421,100	38.7	34.5
Student Services	2	697,400	259,600	6.5	6.5
Total:	39	20,382,400	12,776,500	477.8	297.9
FY 1984					
Academic/Staff	2	265,500	0	10.0	0.0
Administration/Staff	3	1,221,800	0	40.0	0.0
Biological Sciences	3	1,139,300	0	22.5	0.0
Building Support	3	688,500	0	19.5	0.0
Computing(Non-Dept)	4	1,024,500	0	10.0	0.0
Engineering	2	3,948,900	0	43.5	0.0
Humanities/Social Science	1	221,300	0	7.5	0.0
Medical	3	644,300	0	15.6	0.0
Physical Sciences	4	1,553,200	0	35.8	0.0
Public Service	1	175,100	0	1.1	0.0
Student Services	2	78,500	0	2.0	0.0
Total:	28	10,960,900	0	207.5	0.0
FY 1983					
Academic/Staff	7	550,893	0	27.0	0.0
Administration/Staff	11	2,379,969	0	77.4	0.0
Biological Sciences	8	2,020,224	862,900	24.6	18.1
Building Support	4	784,117	391,700	10.4	5.8
Computing(Non-Dept)	3	682,035	0	12.0	0.0
Education	1	44,121	0	0.0	0.0
Engineering	7	6,659,278	5,189,200	62.0	27.3
General Undergraduate	4	1,152,160	0	23.0	0.0
Humanities/Social Science	3	276,262	0	7.0	0.0
Medical	9	1,068,016	508,600	21.3	17.0
Off Campus Instruction	2	571,000	293,600	10.0	7.0
Organized Research	2	1,223,200	73,000	17.5	3.5
Physical Sciences	7	1,674,541	89,200	29.4	2.5
Public Service	4	613,095	50,000	13.0	0.0
Student Services	8	592,702	0	23.5	0.0
Total:	80	20,291,613	7,458,200	358.1	81.2

Table 6

Year/Subject	University Request Count	University Request Total	Legislature Approved Total	Request FTE	Approved FTE
FY 1982					
Academic/Staff	15	4,787,609	1,044,600	147.2	63.0
Administration/Staff	12	1,845,441	601,800	124.6	43.2
Biological Sciences	9	946,911	469,700	14.2	14.2
Building Support	8	2,311,815	741,500	41.0	12.2
Computing(Non-Dept)	5	1,569,385	116,700	19.0	2.0
Engineering	5	1,532,384	832,500	21.1	20.1
General Undergraduate	4	907,198	133,500	20.7	0.0
Humanities/Social Science	7	280,637	67,700	3.4	3.4
Medical	7	582,970	335,100	15.1	9.8
Organized Research	1	449,600	269,900	16.4	10.6
Other (Misc)	1	26,500	19,400	2.0	1.0
Physical Sciences	6	665,306	425,700	0.0	0.0
Public Service	3	551,932	0	0.0	0.0
Student Services	8	924,900	443,900	82.3	22.9
Total:	91	17,382,588	5,502,000	507.0	202.4
FY 1981					
Academic/Staff	38	4,030,394	1,177,000	83.5	57.0
Administration/Staff	11	282,152	55,400	9.0	5.5
Biological Sciences	17	1,246,569	399,600	0.0	4.0
Building Support	6	620,553	144,800	9.0	2.5
Business	3	346,788	278,000	0.0	0.0
Computing(Non-Dept)	6	651,813	541,400	9.0	7.0
Engineering	9	572,864	491,500	9.5	2.0
Humanities/Social Science	9	196,398	112,100	0.0	0.0
Medical	24	831,691	250,900	0.0	7.5
Off Campus Instruction	2	1,100,501	277,100	13.0	5.0
Organized Research	8	686,370	318,700	21.0	11.0
Physical Sciences	7	188,064	31,800	0.0	0.0
Public Service	7	234,087	81,300	1.0	3.5
Student Services	7	682,065	166,200	58.7	6.0
Total:	154	11,670,309	4,325,800	213.7	111.0
Sum:	716	282,498,410	83,013,216	5763.4	1910.3

6/27/88

Program Changes University/Subjects
Table 7

University/Subject	University Request Count	University Request Total	Legislature Approved Total	Rqst FTE	Appro FTE	Average Approved Total
ABOR						
Administration/Staff	9	581,300	0	11	0	0
Computing(Non-Dept)	1	32,500	0	0	0	
General Undergraduate	1	150,000	0	0	0	
Other (Misc)	1	20,000	0	0	0	
Student Services	3	215,000	0	0	0	
Total:	15	998,800	0	11	0	0
ASU						
Academic/Staff	38	22,437,278	6,018,600	579	193	462,969
Administration/Staff	20	18,281,878	2,709,800	642	91	541,960
Biological Sciences	1	1,025,800	0	18	0	
Building Support	9	5,349,050	3,086,500	175	131	440,929
Business	2	2,497,200	2,437,200	51	51	1,218,600
Computing(Non-Dept)	9	7,181,516	269,000	106	5	134,500
Education	1	871,800	0	24	0	
Engineering	14	21,489,796	12,830,100	290	181	1,283,010
General Undergraduate	8	7,725,200	615,800	200	19	307,900
Humanities/Social Science	15	7,302,800	334,700	170	20	83,675
Off Campus Instruction	2	1,314,323	0	21	0	
Organized Research	8	2,393,058	517,000	79	22	258,500
Other (Misc)	1	1,073,300	0	27	0	
Physical Sciences	3	2,072,000	466,800	37	8	466,800
Public Service	3	105,833	0	1	0	0
Student Services	24	5,893,965	837,100	283	36	93,011
Total:	158	107,014,797	30,122,600	2703	756	519,355
ASUW						
Academic/Staff	5	9,114,500	5,185,300	143	137	1,296,325
Administration/Staff	1	2,981,600	2,033,400	30	30	2,033,400
Building Support	4	3,214,200	2,089,300	59	56	522,325
Computing(Non-Dept)	2	2,110,800	0	14	0	
Total:	12	17,421,100	9,308,000	246	223	1,034,222
ASUZ						
Academic/Staff	1	170,000	0	3	0	
Off Campus Instruction	1	314,378	277,100	7	5	277,100
Total:	2	484,378	277,100	10	5	277,100

Table 7

University/Subject	University Request Count	University Request Total	Legislature Approved Total	Rqst FTE	Appro FTE	Average Approved Total
NAU						
Academic/Staff	24	6,360,300	1,442,100	145	70	103,007
Administration/Staff	20	2,487,700	387,200	130	29	77,440
Biological Sciences	4	998,000	739,800	20	19	184,950
Building Support	10	1,839,500	835,000	62	17	167,000
Business	6	1,401,000	659,300	27	11	164,825
Computing(Non-Dept)	11	5,713,200	1,484,900	98	32	247,483
Education	1	500,000	400,000	13	13	400,000
Engineering	4	2,895,000	0	35	0	0
General Undergraduate	8	3,303,500	233,500	70	0	77,833
Humanities/Social Science	3	406,000	0	4	0	
Off Campus Instruction	5	3,185,000	2,278,000	47	59	569,500
Organized Research	2	1,133,000	229,400	14	9	114,700
Other (Misc)	4	1,226,500	816,600	6	3	272,200
Student Services	14	2,264,800	925,100	94	45	154,183
Total:	116	33,713,500	10,430,900	763	306	176,795
UOA						
Academic/Staff	24	4,348,918	337,800	47	12	56,300
Administration/Staff	24	3,797,384	960,600	128	52	192,120
Biological Sciences	73	25,329,704	6,686,100	401	97	318,386
Building Support	15	4,067,335	1,277,309	70	41	255,462
Business	8	2,995,488	650,400	35	9	162,600
Computing(Non-Dept)	18	9,661,217	4,811,400	99	30	601,425
Education	2	469,721	0	9	0	
Engineering	41	15,643,230	5,995,007	189	88	352,647
General Undergraduate	10	4,949,358	2,210,900	132	76	1,105,450
Humanities/Social Science	34	8,071,997	1,189,300	163	25	132,144
Off Campus Instruction	2	672,100	537,500	19	11	537,500
Organized Research	5	161,112	71,600	0	0	35,800
Physical Sciences	53	20,445,211	4,224,400	304	75	281,627
Public Service	14	1,943,181	357,300	28	11	71,460
Student Services	8	2,631,402	444,100	92	19	444,100
Total:	331	105,187,358	29,753,716	1713	546	294,591
UOAM						
Medical	82	17,678,477	3,120,900	317	75	148,614
Total:	82	17,678,477	3,120,900	317	75	148,614
Sum:	716	282,498,410	83,013,216	5763	1910	332,053

6/27/88

Program Changes by Subject/Year
Table 8

Subject and Year	University Request Count	University Request Total	- Legislative $$- Approved Total	Percent Approved	Rqst FTE	Approved FTE	Average Approved
Academic/Staff							
FY 1989	6	6,516,300	700,000	10.7	70.0	27.5	700,000
FY 1988	8	12,312,200	416,000	3.4	274.0	16.0	208,000
FY 1987	7	4,411,800	1,934,600	43.9	127.4	69.1	322,433
FY 1986	7	7,457,700	5,865,800	78.7	124.5	130.9	2,932,900
FY 1985	2	2,098,600	1,845,800	88.0	53.5	48.5	922,900
FY 1984	2	265,500	0	0.0	10.0	0.0	
FY 1983	7	550,893	0	0.0	27.0	0.0	
FY 1982	15	4,787,609	1,044,600	21.8	147.2	63.0	104,460
FY 1981	38	4,030,394	1,177,000	29.2	83.5	57.0	84,071
Total:	92	42,430,996	12,983,800	30.6	917.1	412.0	350,914
Administration/Staff							
FY 1989	10	6,435,100	2,033,400	31.6	119.5	30.0	2,033,400
FY 1988	9	3,410,300	0	0.0	123.0	0.0	
FY 1987	10	7,964,800	2,503,000	31.4	273.6	81.0	417,167
FY 1986	3	1,262,800	181,400	14.4	23.8	4.5	181,400
FY 1985	5	3,327,500	716,000	21.5	150.5	37.5	238,667
FY 1984	3	1,221,800	0	0.0	40.0	0.0	
FY 1983	11	2,379,969	0	0.0	77.4	0.0	
FY 1982	12	1,845,441	601,800	32.6	124.6	43.2	120,360
FY 1981	11	282,152	55,400	19.6	9.0	5.5	55,400
Total:	74	28,129,862	6,091,000	21.7	941.4	201.7	358,294
Biological Sciences							
FY 1989	12	6,314,000	0	0.0	124.0	0.0	
FY 1988	13	7,651,800	804,100	10.5	136.4	10.5	804,100
FY 1987	8	4,017,900	2,152,600	53.6	53.3	33.3	430,520
FY 1986	4	1,985,500	1,219,000	61.4	35.8	14.8	406,333
FY 1985	4	2,031,300	1,518,000	74.7	27.7	20.9	379,500
FY 1984	3	1,139,300	0	0.0	22.5	0.0	
FY 1983	8	2,020,224	862,900	42.7	24.6	18.1	287,633
FY 1982	9	946,911	469,700	49.6	14.2	14.2	156,567
FY 1981	17	1,246,569	399,600	32.1	0.0	4.0	66,600
Total:	78	27,353,504	7,425,900	27.1	438.5	115.8	297,036

Table 8

	University	University	- Legislative $$-				
Subject and Year	Request Count	Request Total	Approved Total	Percent Approved	Rqst FTE	Approved FTE	Average Approved
Building Support							
FY 1989	8	3,846,400	2,219,409	57.7	86.4	67.4	369,902
FY 1988	3	2,894,300	1,341,500	46.3	70.6	48.0	670,750
FY 1987	3	727,800	155,000	21.3	28.1	9.0	77,500
FY 1986	2	2,436,600	2,134,200	87.6	92.0	92.0	1,067,100
FY 1985	1	160,000	160,000	100.0	8.0	8.0	160,000
FY 1984	3	688,500	0	0.0	19.5	0.0	
FY 1983	4	784,117	391,700	50.0	10.4	5.8	195,850
FY 1982	8	2,311,815	741,500	32.1	41.0	12.2	148,300
FY 1981	6	620,553	144,800	23.3	9.0	2.5	144,800
Total:	38	14,470,085	7,288,109	50.4	365.0	244.9	347,053
Business							
FY 1989	3	1,004,200	0	0.0	19.8	0.0	
FY 1988	4	2,767,100	1,895,000	68.5	57.6	40.0	947,500
FY 1987	4	1,866,700	706,900	37.9	21.0	16.8	235,633
FY 1986	2	908,900	867,000	95.4	14.5	14.5	433,500
FY 1981	3	346,788	278,000	80.2	0.0	0.0	92,667
Total:	16	6,893,688	3,746,900	54.4	112.9	71.3	374,690
Computing(Non-Dept)							
FY 1989	3	3,645,300	542,200	14.9	68.0	18.0	542,200
FY 1988	8	8,314,500	319,500	3.8	119.2	3.0	159,750
FY 1987	5	4,120,900	2,547,100	61.8	27.0	15.0	636,775
FY 1986	5	3,235,600	1,443,700	44.6	38.5	7.5	721,850
FY 1985	2	1,455,200	1,054,700	72.5	14.0	14.0	527,350
FY 1984	4	1,024,500	0	0.0	10.0	0.0	
FY 1983	3	582,035	0	0.0	12.0	0.0	
FY 1982	5	1,569,385	116,700	7.4	19.0	2.0	58,350
FY 1981	6	651,813	541,400	83.1	9.0	7.0	180,467
Total:	41	24,699,233	6,565,300	26.6	316.7	66.5	410,331
Education							
FY 1989	1	871,800	0	0.0	24.0	0.0	
FY 1988	1	425,600	0	0.0	8.6	0.0	
FY 1986	1	500,000	400,000	80.0	13.0	13.0	400,000
FY 1983	1	44,121	0	0.0	0.0	0.0	
Total:	4	1,841,521	400,000	21.7	45.6	13.0	400,000

Table 8

			- Legislative $$-				
Subject and Year	University Request Count	University Request Total	Approved Total	Percent Approved	Rqst FTE	Approved FTE	Average Approved
Engineering							
FY 1989	13	9,442,700	4,546,107	48.1	115.0	56.5	649,444
FY 1988	8	5,264,200	709,400	13.5	82.3	29.2	354,700
FY 1987	5	4,398,100	1,495,400	34.0	52.7	19.3	498,467
FY 1986	4	2,771,000	1,087,500	39.2	31.8	18.8	1,087,500
FY 1985	6	5,438,600	4,473,500	82.3	96.0	96.0	745,583
FY 1984	2	3,948,900	0	0.0	43.5	0.0	
FY 1983	7	6,659,278	5,189,200	77.9	62.0	27.3	2,594,600
FY 1982	5	1,532,384	832,500	54.3	21.1	20.1	416,250
FY 1981	9	572,864	491,500	85.8	9.5	2.0	81,917
Total:	59	40,028,026	18,825,107	47.0	513.9	269.2	649,142
General Undergraduate							
FY 1989	5	3,965,600	0	0.0	98.6	0.0	
FY 1988	8	7,110,800	914,700	12.9	172.0	25.5	457,350
FY 1987	4	2,450,500	2,012,000	82.1	77.2	69.2	670,667
FY 1986	1	351,100	0	0.0	4.0	0.0	
FY 1985	1	190,700	0	0.0	6.0	0.0	
FY 1983	4	1,152,160	0	0.0	23.0	0.0	
FY 1982	4	907,198	133,500	14.7	20.7	0.0	66,750
Total:	27	16,128,058	3,060,200	19.0	401.5	94.7	437,171
Humanities/Social Science							
FY 1989	10	4,437,600	364,700	8.2	116.5	20.0	182,350
FY 1988	10	4,859,100	0	0.0	101.5	0.0	
FY 1987	6	3,844,800	221,000	5.7	65.0	6.0	55,250
FY 1986	4	1,211,900	430,700	35.5	21.4	7.0	430,700
FY 1985	2	452,800	327,800	72.4	14.7	9.0	327,800
FY 1984	1	221,300	0	0.0	7.5	0.0	
FY 1983	3	276,262	0	0.0	7.0	0.0	
FY 1982	7	280,637	67,700	24.1	3.4	3.4	67,700
FY 1981	9	196,398	112,100	57.1	0.0	0.0	28,025
Total:	52	15,780,797	1,524,000	9.7	337.0	45.4	117,231

Table 8

Subject and Year	University Request Count	University Request Total	- Legislative $$-		Rqst FTE	Approved FTE	Average Approved
			Approved Total	Percent Approved			
Medical							
FY 1989	7	4,204,700	329,000	7.8	66.2	9.0	164,500
FY 1988	12	4,480,900	133,700	3.0	82.1	5.0	133,700
FY 1987	6	2,888,200	1,038,800	36.0	51.1	15.5	519,400
FY 1986	7	1,703,400	524,800	30.8	33.9	10.8	262,400
FY 1985	7	1,274,300	0	0.0	32.2	0.0	0
FY 1984	3	644,300	0	0.0	15.6	0.0	0
FY 1983	9	1,068,016	508,600	47.6	21.3	17.0	169,533
FY 1982	7	582,970	335,100	57.5	15.1	9.8	111,700
FY 1981	24	831,691	250,900	30.2	0.0	7.5	41,817
Total:	82	17,678,477	3,120,900	17.7	317.5	74.6	148,614
Off Campus Instruction							
FY 1989	2	2,052,600	1,227,500	59.8	31.0	27.0	613,750
FY 1988	1	219,500	0	0.0	3.7	0.0	
FY 1987	2	1,128,200	294,400	26.1	33.0	13.0	294,400
FY 1985	1	414,000	1,000,000	241.5	3.0	23.0	1,000,000
FY 1983	2	571,000	293,600	51.4	10.0	7.0	293,600
FY 1981	2	1,100,501	277,100	25.2	13.0	5.0	277,100
Total:	10	5,485,801	3,092,600	56.4	93.7	75.0	515,433
Organized Research							
FY 1989	1	373,400	0	0.0	10.0	0.0	
FY 1988	1	360,400	0	0.0	10.5	0.0	
FY 1987	1	234,200	0	0.0	7.0	0.0	
FY 1986	1	360,000	156,400	43.4	10.0	5.0	156,400
FY 1983	2	1,223,200	73,000	6.0	17.5	3.5	73,000
FY 1982	1	449,600	269,900	60.0	16.4	10.6	269,900
FY 1981	8	686,370	318,700	46.4	21.0	11.0	106,233
Total:	15	3,687,170	818,000	22.2	92.4	30.1	136,333
Other (Misc)							
FY 1988	2	270,000	0	0.0	4.0	0.0	
FY 1987	1	950,000	697,200	73.4	0.0	0.0	697,200
FY 1986	1	0	100,000	0.0	0.0	2.0	100,000
FY 1985	1	1,073,300	0	0.0	27.0	0.0	
FY 1982	1	26,500	19,400	73.2	2.0	1.0	19,400
Total:	6	2,319,800	816,600	35.2	33.0	3.0	272,200

Table 8

Subject and Year	University Request Count	University Request Total	- Legislative $$- Approved Total	Percent Approved	Rqst FTE	Approved FTE	Average Approved
Physical Sciences							
FY 1989	6	3,847,800	0	0.0	54.5	0.0	
FY 1988	7	4,276,600	83,500	2.0	61.5	4.0	83,500
FY 1987	9	5,244,900	2,000,000	38.1	84.3	30.5	400,000
FY 1986	5	3,298,100	639,900	19.4	36.2	11.2	319,950
FY 1985	5	1,768,700	1,421,100	80.3	38.7	34.5	473,700
FY 1984	4	1,553,200	0	0.0	35.8	0.0	
FY 1983	7	1,674,541	89,200	5.3	29.4	2.5	89,200
FY 1982	6	665,306	425,700	64.0	0.0	0.0	212,850
FY 1981	7	188,064	31,800	16.9	0.0	0.0	15,900
Total:	56	22,517,211	4,691,200	20.8	340.4	82.7	293,200
Public Service							
FY 1987	1	257,800	226,000	87.7	7.0	7.0	226,000
FY 1986	1	217,000	0	0.0	7.0	0.0	
FY 1984	1	175,100	0	0.0	1.1	0.0	
FY 1983	4	613,095	50,000	8.2	13.0	0.0	50,000
FY 1982	3	551,932	0	0.0	0.0	0.0	0
FY 1981	7	234,087	81,300	34.7	1.0	3.5	27,100
Total:	17	2,049,014	357,300	17.4	29.1	10.5	59,550
Student Services							
FY 1989	7	3,695,000	207,500	5.6	139.4	11.0	103,750
FY 1988	4	852,100	0	0.0	33.8	0.0	
FY 1987	4	608,600	322,100	52.9	27.0	18.0	107,367
FY 1986	7	2,873,900	807,000	28.1	94.6	35.5	269,000
FY 1985	2	697,400	259,600	37.2	6.5	6.5	129,800
FY 1984	2	78,500	0	0.0	2.0	0.0	
FY 1983	8	592,702	0	0.0	23.5	0.0	
FY 1982	8	924,900	443,900	48.0	82.3	22.9	88,780
FY 1981	7	682,065	166,200	24.4	58.7	6.0	166,200
Total:	49	11,005,167	2,206,300	20.0	467.8	99.9	137,894
Sum:	716	282,498,410	83,013,216	29.4	5763.41910.3		332,053

6/27/88

Approved Changes by Subject/University
Table 9

Subject/University	Count	Rqst Total	App Total	Rqst FTE	App FTE	Percent of All Approv Funding
Academic/Staff						
ASU	10	7,315,838	6,018,600	229.0	193.0	8.56
ASUW	4	8,604,600	5,185,300	142.9	137.0	7.37
NAU	11	2,226,700	1,442,100	73.5	70.0	2.05
UOA	6	407,245	337,800	12.0	12.0	.48
Total:	31	18,554,383	12,983,800	457.4	412.0	18.46
Administration/Staff						
ASU	2	3,053,500	2,709,800	100.0	91.0	3.85
ASUW	1	2,981,600	2,033,400	30.0	30.0	2.89
NAU	4	435,900	387,200	25.0	28.5	.55
UOA	5	1,009,862	960,600	52.2	52.2	1.37
Total:	12	7,480,862	6,091,000	207.2	201.7	8.66
Biological Sciences						
NAU	4	998,000	739,800	20.0	19.0	1.05
UOA	21	7,042,393	6,642,500	99.6	96.8	9.44
Total:	25	8,040,393	7,382,300	119.6	115.8	10.49
Building Support						
ASU	6	3,823,850	3,086,500	143.5	130.5	4.39
ASUW	4	3,214,200	2,089,300	59.0	56.0	2.97
NAU	4	835,000	835,000	17.0	17.0	1.19
UOA	5	2,338,053	1,277,309	48.3	41.4	1.82
Total:	19	10,211,103	7,288,109	267.8	244.9	10.36
Business						
ASU	2	2,497,200	2,437,200	51.0	51.0	3.46
NAU	3	985,000	659,300	15.5	11.3	.94
UOA	4	720,688	650,400	9.0	9.0	.92
Total:	9	4,202,888	3,746,900	75.5	71.3	5.33
Computing(Non-Dept)						
ASU	2	1,180,116	269,000	19.0	5.0	.38
NAU	5	3,373,200	1,484,900	52.0	32.0	2.11
UOA	10	4,862,958	4,811,400	29.5	29.5	6.84
Total:	17	9,416,274	6,565,300	100.5	66.5	9.33
Education						
NAU	1	500,000	400,000	13.0	13.0	.57
Total:	1	500,000	400,000	13.0	13.0	.57
Engineering						
ASU	9	11,577,996	12,830,100	194.5	181.0	18.24
UOA	16	6,023,148	5,819,107	88.2	88.2	8.27
Total:	25	17,601,144	18,649,207	282.7	269.2	26.51
General Undergraduate						
ASU	1	617,900	615,800	19.0	19.0	.88
NAU	2	1,133,500	233,500	0.0	0.0	.33
UOA	2	2,227,300	2,210,900	75.7	75.7	3.14
Total:	5	3,978,700	3,060,200	94.7	94.7	4.35

Table 9

Subject/University	Count	Rqst Total	App Total	Rqst FTE	App FTE	Percent of All Approv Funding
Humanities/Social Science						
ASU	1	419,900	334,700	20.0	20.0	.48
UOA	9	1,905,420	1,189,300	42.9	25.4	1.69
Total:	10	2,325,320	1,524,000	62.9	45.4	2.17
Medical						
UOAM	19	4,897,239	3,120,900	84.3	74.6	4.44
Total:	19	4,897,239	3,120,900	84.3	74.6	4.44
Off Campus Instruction						
ASUZ	1	314,378	277,100	7.0	5.0	.39
NAU	4	3,155,000	2,278,000	47.0	59.0	3.24
UOA	1	452,600	537,500	15.0	11.0	.76
Total:	6	3,921,978	3,092,600	69.0	75.0	4.40
Organized Research						
ASU	2	949,521	517,000	35.9	21.6	.73
NAU	2	1,133,000	229,400	13.5	8.5	.33
UOA	2	74,801	71,600	0.0	0.0	.10
Total:	6	2,157,322	818,000	49.4	30.1	1.16
Other (Misc)						
NAU	3	976,500	816,600	2.0	3.0	1.16
Total:	3	976,500	816,600	2.0	3.0	1.16
Physical Sciences						
ASU	1	468,000	466,800	7.5	7.5	.66
UOA	14	4,747,769	3,949,400	75.2	75.2	5.61
Total:	15	5,215,769	4,416,200	82.7	82.7	6.28
Public Service						
UOA	5	339,663	357,300	7.0	10.5	.51
Total:	5	339,663	357,300	7.0	10.5	.51
Student Services						
ASU	7	1,799,000	837,100	58.2	36.4	1.19
NAU	6	1,430,100	925,100	58.7	44.5	1.32
UOA	1	1,039,600	444,100	34.3	19.0	.63
Total:	14	4,268,700	2,206,300	151.2	99.9	3.14
Sum:	222	104,088,238	82,518,716	2126.9	1910.3	100.00

6/27/88

Program Change Subject Summary
Nine Year Summary FY 81-89
Legislatively Approved Only
Table 10

Subject	Request Count	Request Total	Approved Total	Request FTE	Approved FTE
Academic/Staff	31	18,554,383	12,983,800	457.4	412.0
Administration/Staff	12	7,480,862	6,091,000	207.2	201.7
Biological Sciences	25	8,040,393	7,382,300	119.6	115.8
Building Support	19	10,211,103	7,288,109	267.8	244.9
Business	9	4,202,888	3,746,900	75.5	71.3
Computing(Non-Dept)	17	9,416,274	6,565,300	100.5	66.5
Education	1	500,000	400,000	13.0	13.0
Engineering	25	17,601,144	18,649,207	282.7	269.2
General Undergraduate	5	3,978,700	3,060,200	94.7	94.7
Humanities/Social Science	10	2,325,320	1,524,000	62.9	45.4
Medical	19	4,897,239	3,120,900	84.3	74.6
Off Campus Instruction	6	3,921,978	3,092,600	69.0	75.0
Organized Research	6	2,157,322	818,000	49.4	30.1
Other (Misc)	3	976,500	816,600	2.0	3.0
Physical Sciences	15	5,215,769	4,416,200	82.7	82.7
Public Service	5	339,663	357,300	7.0	10.5
Student Services	14	4,268,700	2,206,300	151.2	99.9
Totals:	222	104,088,238	82,518,716	2127	1910

Note: Requests are included for ABOR staff, ASU, ASUW, NAU, NAYuma, UOA, UOAM

Program Review Summary: FY 81-FY 89*

Table 11

	A	B	C	D	E	F	G	H	I
ASU FY	# Sub	ABOR Guide	Prev Yr Budget	Rqst	Percent $Prev Yr	App$	App%Rqst	Appro% LY Bud	NAU Ratio Approv
89	28	10	$199.1	20.2	10.15	3.5	17.33	1.76	1.84
88	24	9	$179.1	22.4	12.51	2.6	11.61	1.45	6.50
87	22	10	$170.3	16.3	9.57	7.2	44.17	4.23	3.27
86	12	7	$153.9	10.8	7.02	5.1	47.22	3.31	3.00
85	4	N	$134.7	7.9	5.86	3.2	40.51	2.38	1.60
84	5	N	$122.4	4.9	4.00	0	.00	.00	
83	8	N	$121.1	8.4	6.94	5.1	60.71	4.21	7.29
82	25	N	$109.2	10.4	9.52	2.1	20.19	1.92	2.63
81	29	N	$91.6	5.6	6.11	1.3	23.21	1.42	1.86
Total/Avg	157			106.9	7.96	30.1	28.16		2.89

NAU FY	# Sub	ABOR Guide	Prev Yr Budget	Rqst	Percent $Prev Yr	App$	App%Rqst	Appro% LY Bud	Approv nau=1
89	9	10	$66.9	8.3	12.41	1.9	22.89	2.84	1.00
88	15	9	$60.7	7.6	12.52	.4	5.26	.66	1.00
87	16	10	$56.9	5.7	10.02	2.2	38.60	3.87	1.00
86	12	7	$50.6	3.6	7.11	1.7	47.22	3.36	1.00
85	7	N	$45.7	1.8	3.94	2	111.11	4.38	1.00
84	9	N	$41.2	1.2	2.91	0	.00	.00	
83	20	N	$40.6	3.5	8.62	.7	20.00	1.72	1.00
82	13	N	$36.6	1.1	3.01	.8	72.73	2.19	1.00
81	13	N	$31.0	1	3.23	.7	70.00	2.26	1.00
Total/Avg	114			33.8	7.08	10.4	30.77		1.00

UOA FY	# Sub	ABOR Guide	Prev Yr Budget	Rqst	Percent $Prev Yr	App$	App%Rqst	Appro% LY Bud	Approv nau=1
89	37	10	$216.3	21.7	10.03	3.6	16.59	1.66	1.89
88	40	9	$200.3	24.8	12.38	1.7	6.85	.85	4.25
87	27	10	$188.6	18.8	9.97	7.2	38.30	3.82	3.27
86	22	7	$169.0	11.8	6.98	6	50.85	3.55	3.53
85	20	N	$155.2	7.5	4.83	6	80.00	3.87	3.00
84	11	N	$140.5	4.2	2.99	0	.00	.00	
83	42	N	$140.4	7.3	5.20	1.2	16.44	.85	1.71
82	45	N	$126.4	5.1	4.03	2.3	45.10	1.82	2.88
81	86	N	$108.8	4	3.68	1.8	45.00	1.65	2.57
Total/Avg	330			105.2	6.68	29.8	28.33		2.87

* See explanation of Columns on next page.

Table 11

UOAM FY	# Sub	ABOR Guide	Prev Yr Budget	Rqst	Percent $Prev Yr	App$	App%Rqst	Appro% LY Bud
89	37	10	$41.7	4.2	10.07	.3	7.14	.72
88	40	9	$38.0	4.5	11.84	.1	2.22	.26
87	27	10	$35.8	2.9	8.10	1	34.48	2.79
86	22	7	$32.1	1.7	5.30	.5	29.41	1.56
85	20	N	$23.1	1.3	5.63	0	.00	.00
84	11	N	$20.5	.6	2.93	0	.00	.00
83	42	N	$20.0	1.1	5.50	.5	45.45	2.50
82	45	N	$18.6	.6	3.23	.3	50.00	1.61
81	86	N	$15.9	.8	5.03	.3	37.50	1.89
Total/Avg	330			17.7	6.40	3.1	17.51	

Definitions for Table 11

Column	Definition
A	Number of total program changes submitted by the university
B	Guideline from ABOR on the dollar value of initially submitted program changes. This percentage is of the previous year expenditure authority for each university. Only the last four years are available as guidelines.
C	Previous years budget is the expenditure authority.
D	Request dollars is the total of all program change submissions by the university.
E	Percent of previous year is the actual program change request dollars compared to the previous year expenditure authority. This is to be compared to the guideline (column B).
F	Apropriated dollars is the amount of approved program changes.
G	Appropriated as a percent of requested is the percent of program change approvals compared to the amount submitted.
H	Appropriation as a percent of last years budget is the percent of approved program changes of the last year expenditure authority.
I	NAU Ratio is the ratio of approved program changes compared to NAU as a base of 1.0.

ENDNOTE

1. Arizona Board of Regents, Proposed Budget Study Report, February 2, 1988, 16 pages with appendices.

ENROLLMENT AT ARIZONA UNIVERSITIES: FORECASTS TO THE YEAR 2000

ROGER L. CALDWELL AND KENNETH BROWN

PREFACE

Information contained in this working paper is to provide background on the national and state level for making judgements about future enrollment options for the Arizona universities. While a limited amount of information is presented for each of the three universities, most consists of the total of the universities. Accordingly, some of the trends may not apply to an individual campus and the actual changes within one campus will differ from the others.

It is very difficult to make enrollment forecasts to the year 2000 for Arizona. This working paper addressed this difficulty by identifying relevant trends, both nationally and within the state, listing appropriate assumptions, and identifying several possible enrollment futures.

The report provides several tables and figures in the main body, with detailed reference materials presented in the appendices. Where references are made to a table or figure in the appendix, the number will be preceded by the appendix letter.

The following abbreviations are found in the report:

ABOR	Arizona Board of Regents
NCHEMS	National Center for Higher Education Management Systems
WICHE	Western Interstate Commission on Higher Education
ASU	Arizona State University
NAU	Northern Arizona University
UA	University of Arizona

SUMMARY

The Arizona universities have grown relatively rapidly compared to some other universities, but have not grown significantly over the last 15 years. Over the period 1970 to 1985, the average annual growth rate (not compounded) was 1.8 percent for credit hours taken, 1.4 percent for full time student enrollment, and 2.5 percent head count student enrollment. However, high school graduation trends suggest Arizona will be faced with a level to declining freshman student enrollment period beginning in fall 1989 followed by a significant growth period beginning in fall 1992. How we react to these changing times in an efficient and effective manner will require careful enrollment management techniques.

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Higher education throughout the country grew rapidly from about 1955 to about 1975, followed by a general up and down drift for the last decade; Arizona is not unlike the national trends in this behavior. The large shifts in higher education were due to 1) greater percent of the 18-24 year old population attending college, 2) greater percentage of women attending college, and 3) demographic trends which caused the baby boom age to coincide with college going years (boomers achieved age 18 in the early 1960s). Smaller trends relate to a slowly increasing part-time student population and in the case of Arizona, a declining percentage of the state population attending college. This latter observation is likely due to relative increased migration of professionally educated persons and a growing very young and older population.

In the next decade the strongest impact on enrollment trends will be the demographic effects of the baby boom (including in-state changes and interstate migration) and its echo and the ethnic composition of the population. Using estimates developed in other studies, it appears that a relative enrollment high in Arizona will be experienced in the fall of 1989 and a relative enrollment low in the fall of 1992. Other states seem likely to be more severely affected, with a sharper and more sustained decrease. Other variables are likely to have a lesser effect (such as increasing part time students, retraining graduates for new careers or using telecommunications for distance education). For Arizona the impacts of the declining 18-24 year old population over the next five to seven years (depending on which state you are evaluating) will be minimal but significant. The challenges will include:

- o Increasing the proportion of minority students enrolled in higher education to approximate the proportion graduating from high school,

- o Applying enrollment management methods to maintain a quality educational experience while continuing to provide access to qualified Arizona students,

- o Planning for alternative ways to address the anticipated student demand for higher education.

The opportunity exists for developing solutions to these challenges. The decline in traditional-age freshmen students will allow time to better understand and adjust to the realities of the demographic trends, the changing Arizona universities, and the future needs of the state. Some of the implications of this change are:

- o Competition for both undergraduate and graduate students with other states is likely to increase. The states of most likely impact are those which send or receive students with Arizona: California, Illinois, Colorado, New Mexico, New York, Michigan, Texas, Kansas, and Utah;

- o The anticipated increases in minorities in the school and college age groups will require increased recruitment efforts and resource expenditures on the part of Arizona's universities;

- o Planning for the next five year period (1988-1993) will be much different than the following five year period (1994-2000) and will require greater management involvement than in the past;
- o Institutional resistance to change as well as the impacts of new

educational or communications technology are hard to estimate but may be significant;

- Increases in enrollment levels will undoubtedly produce a number of solutions, however, these are likely to be more successful in combination that individually.

Estimates for the Arizona universities headcount enrollment changes from 1985 to 2000 vary considerably. Previous estimates ranged from 33 to 48 thousand; a broader set of assumptions developed in this working paper gives a range of 23 to 80 thousand. For planning purposes, we have selected a range of 20 to 30 thousand. However, an important conclusion of this working paper is that there are many assumptions involved in these forecasts; some are under the control of the universities and some are not.

INTRODUCTION

BACKGROUND AND PURPOSE

Enrollment forecasts for the Arizona universities to the year 2000 are important for several reasons:

1) the Arizona universities are approaching enrollment levels where quality, efficiency, and student experience at each university should be reevaluated,

2) the national high school graduating class size will decline for several years (and Arizona's to a lesser extent) and then increase in the late 1990s, and

3) questions are being asked about additional branch campuses or off-campus sites for the state. Two aspects of future enrollment conditions in particular that require special understanding are:

- Increasing percentage of minorities in the general population;
- Impacts of the baby boom population shift on interstate migration (general population and college-age) and high school graduation rates.

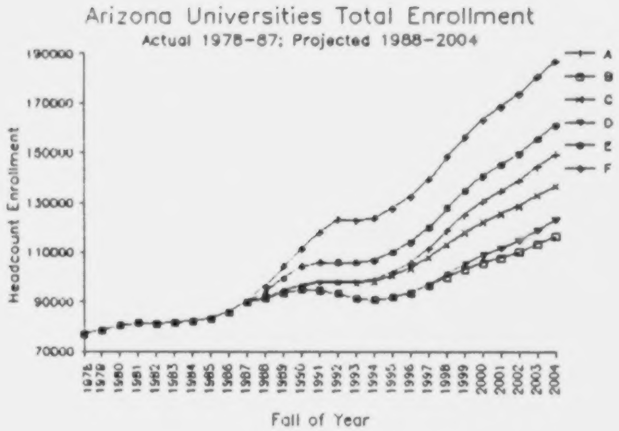
The analysis and understanding of these issues are the purposes of an enrollment management plan. As the Arizona universities continue to define their missions and types of institutions, the quality and number of students will be an important consideration. As possible shifts in the numbers of traditional-age students occur, the universities would like to prevent sharp swings in enrollment. As high school graduation numbers decrease nationally over the next five to seven years, there will be new competition among the nation's universities. As the number of minority children increase, especially in Arizona, new demands will force the educational system to enhance access to the university and to retain the students once they are on campus.

The purposes of this working paper are to review historical enrollments, to provide a range of probable enrollment forecasts, and to identify the critical variables for enrollment related university planning. Since the strategic planning process for the Arizona university system and the individual campuses is in process, the enrollment management comments presented here are not presented within the context of other planning perspectives.[1]

ARIZONA ENROLLMENT POSSIBILITIES

Enrollments in Arizona's public universities and community colleges grew rapidly in the mid 1960s to the mid 1970s, and have exhibited a steady but slow growth trend during the last decade. Forecasts of future enrollment in the Arizona universities provide a wide range of options. There are a number of components of the forecasting process that are under university control, and a number that are not. As an example of the ranges we might consider, six forecasts are presented in Figure 1. These same six forecasts will be discussed in more detail in the section on Enrollment Scenarios for Year 2000:

Figure 1. Arizona Enrollment Futures*



HISTORICAL TRENDS AND DRIVING FORCES OF CHANGE

HISTORICAL TRENDS

There has been frequent mention of how universities will be increasing the percentage of the nontraditional students (e.g., older, part-time, distant) and retraining existing college graduates as the job markets shift and require new skills. There is also mention of the importance of increasing the higher education of citizens so they can cope with the demands of high technology and the increasingly complex society as employees and as members of the general population. Finally, there is mention of increasing the percentage of high school graduates within the overall population.

It is difficult to estimate how these "changes" in increased numbers of part-time students, and increased high school and university graduates will take place. Historically, within the nation as a whole, there have not been large changes in the last decade or so in any of the commonly stated variables (e.g., headcount or FTE enrollment, student credit hours). There are still some increases occurring in part-time enrollment in higher education. It has increased from 32.2 percent in 1970 to 38.8 percent in 1975 to 42.2 percent in 1985 (Table B1 and B2). Nationally, in the last 25 years (1960 to 1985) high school graduates as a percent of the 17 year old population has changed from 69.5 to 76.9 to 71.4 to 73.3 percent (Table B5). The years of college completed by the 25-35 year old population has not changed much from 1980 to 1985 (Table B3) and the percentage of female students has essentially leveled at 53.2 percent female (or at least the growth rate has slowed

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A = base model of historic trends; B = lower in-migration, lowered high school progression rates, and graduate enrollment cap; C = graduate enrollment cap at 23,000; D = lower high school progression rate; E = university retention increased 10 percent; F = off-campus enrollment increase to 25 percent of on-campus.

substantially), but the percentage of females that are full time is less (56.1 percent) than for males (63.6) with the overall average of part time at 59.6 percent in 1985 (Table B2). National and Arizona enrollment growth over the last 15 years is shown in Table 1.

Table 1. Growth Enrollments for Higher Education (in thousands)

Year	Enrollment National 2-Yr	4-Yr	Enrollment National Female	Male	No. Inst National 2-Yr	4-Yr	Enrollment Arizona 2-Yr	4-Yr
1970	1,630	6,290	3.284	4,637	891	1.665	43.316	66.791
1975	2,588	7,143	4.410	5.321	1.128	1.898	98.691	82.351
1980	4,526	7,571	6.223	5.874	1,274	1,957	113,710	89,064
1985	4,531	7,716	6.429	5.818	1,311	2,029	117,484	91.287

Includes public and private institutions. Sources: National Center for Education Statistics, Valley National Bank of Arizona.

The enrollment in higher-education institutions as a percent of the 18-24 year old population or of the high school graduating class has been relatively constant (in 1985 at 27.8 percent of 18-24 year old population and 33.7 percent of the high school graduates), see Table B6. In fact, if current trends continue, the increasing percentage of minorities in the high school age group will actually cause the high school graduation numbers to drop (due to the higher drop-out rate for minorities). The inertia of society is such that we might not expect major changes in these trends in the next 12 years, but on the other hand, there are new forces that might make major changes.[2] This uncertainty contributes to the complexity of attempting long-term enrollment forecasting.

Arizona universities are not only attractive to in-state students but out-of-state students as well. For example, Arizona is the state with the highest ratio of students entering to students leaving the state for higher education, at a ratio of 3.1 compared to the national average of 1.2 (Table B4). Arizona also has the highest proportion of native first-time college students enrolled on its campuses (with 97 percent, followed by California at 95 percent and Texas at 94 percent). Arizona in-migration for university students is primarily from six states (with Fall 1984 numbers): California (1,641), Illinois (797), Colorado (566), New Mexico (487), New York (478), and Michigan (379). Arizona out-migration to other state's universities is primarily to five states (with Fall 1984 numbers): California (1,276), Kansas (374), Texas (348), Utah (344), and New Mexico (261), see Bartram and Gebel (1988).

Overall Arizona population (all ages) in-migration in 1984-85 is primarily from: California, Illinois, New Mexico, Texas, and Colorado. Overall Arizona population out-migration is primarily to (1984-85): California, New Mexico, Texas, Colorado. These migration patterns change by year, and in the last 5 years (FY 81-85) California, Ohio, Michigan, and New York net migrations have been decreasing, while Washington, and Illinois have been increasing and the net loss to Texas has been decreasing (Bartram and Gebel 1988).

Arizona has 94 percent of its higher education enrollment in public institutions, compared to 78 percent for the nation. This proportion is also higher than other western states (e.g., CA, CO, OR, UT, WA). Arizona students in higher education at full-time status are only 46 percent compared to 58 percent nationally. This is similar to California at 44 percent but lower than other western states (e.g., CO, OR, UT, WA).

Therefore, the states of primary interest for the university enrollment and state population changes in Arizona are: California, Illinois, Colorado, New Mexico, New York, Michigan, Texas, Kansas, and Utah. The projected high school graduates to the year 2004 for these states are shown in Appendix D.

The growth rate of total university headcount enrollment slowed somewhat in Arizona over the period 1975 to 1985 (Table 2 and Figure 2). Actual headcount increases in undergraduate have been getting smaller, while graduate growth was very small over the period and actually declined from 1975 to 1980.

Table 2. Arizona Undergraduate and Graduate Enrollments*

Year	Headcount Total	Headcount Undergrad	Headcount Graduate	SCH	Total FTE
1970	60,218	47,001	13,411	759,092	54,064
1975	75,065	55,281	19,784	880,532	62,407
1980	80,408	61,565	18,843	922,220	64,722
1985	83,547	63,611	20,236	935,783	65,707

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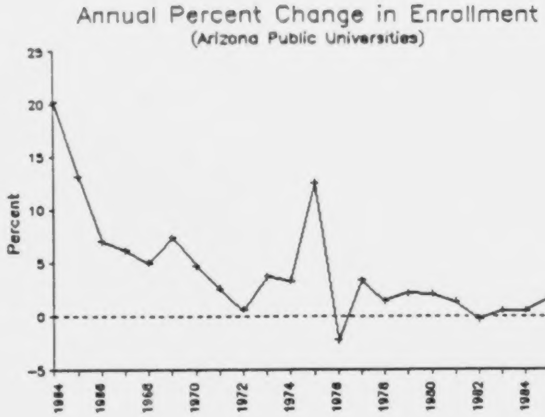
* Total includes ASU, ASUW (separate category for FY 85), NAU, UA on-campus), FTE calculated using old method.

The overall growth rate of the Arizona universities showed a generally declining trend during the 20 year period from 1964 to 1984, however, this trend seems to have been reversed over the last three years, as shown in Figure 2.

Figure 2. Percent Annual Change in Arizona Universities Enrollment*



The ratio of Arizona high school graduates to university enrollment has been slowly increasing over the last 25 years (Figure B1), but this trend is confounded by the growth of community college enrollments (and in-migration or out-migration of high school age students) (Figure B2). The ratio of Arizona population to high school graduates had been increasing, with a marked acceleration since 1979 (Figure B3). The university total headcount enrollment per 1000 population increased to the early 1970s and has been declining since that time (Figure B4). The ratio of community college enrollment to university enrollment increased rapidly from the early 1960s to 1975 with a change to a slow increase since that time (Figure B5). These changes indicate the rapid growth to the early to mid 1970s with relatively little change until the last three to four years. Graduate enrollment at the universities as a percentage of the total enrollment grew until about 1975, and has remained relatively stable since that year (Figure

B6). These changes not only reflect a national change but also indicate the maturing of higher education in Arizona (community colleges and universities). Although enrollments in Arizona community colleges and universities have been increasing rather slowly for over a decade, demographic changes projected to occur over the next 12 years indicate that we cannot rely on simple extrapolation of recent trends in estimating future enrollments. The age distribution of students at the Arizona universities is such that the high school graduating class is an important indicator of university enrollments. For example, at all three universities, the 18-24 year-old on-campus (including full- and part-time) undergraduate group accounts for 76-84 percent of the total undergraduate population (see Table B7).

DRIVING FORCES

There are several changes that have accounted for enrollment patterns in the last 15 years (1970 - 1985). These include:

1. The national growth in four-year college enrollments was 23 percent compared to a 178 percent increase in community college enrollments. The Arizona growth rate for universities was 39 percent and for community colleges was 171 percent. The growth rates of these two sectors, both nationally and in Arizona, have been more comparable in the last five years.

2. The percentage of women in higher education has increased 96 percent compared to a 25 percent increase for men (with more women than men currently enrolled). This accounts for a greater percentage growth in enrollment than if the population had been more equally represented through the 15 year period.

3. The baby boom (those born in late 1940s through early 1960s) accounted for a large number of people in the 20-39 age group.

Several of these changes in the last period of major enrollment increases will not be repeated during the next period of enrollment increase (late 1990s). The single most important factor in the next enrollment increase (and the preceding decline) is the age distribution of children of the baby boom cohort.

Since the high school age population is a strong predictor of future university enrollments, at least for the types of universities we have in Arizona, some knowledge of the likely distribution of that population over the next 15 years is necessary in order to give some understanding of potential future enrollment issues. The WICHE forecasts for the nation are shown in Figure 3.

Figure 3. National WICHE High School Graduate Forecast.

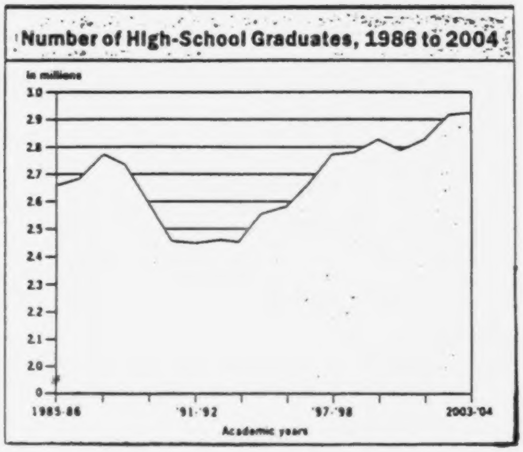
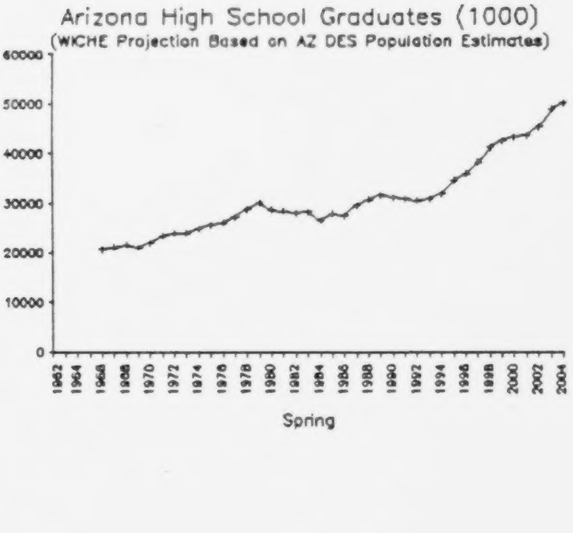


Figure 4. Arizona High School Graduates: Historic and Projection



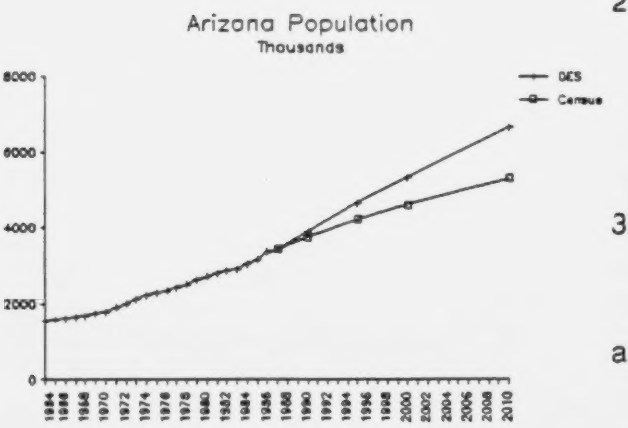
Arizona high school graduates increased to about 1979, declined until about 1985, and are projected to peak again about 1989. This will be followed by a small decline and a rapid increase to the year 2000 and beyond. This change in high school graduates can also been seen relative to the overall population. The ratio of Arizona population to high school graduates was relatively constant from 1966 to 1979, when the ratio changed markedly to a higher population per high school graduate (see Figure B3).[3]

PREVIOUS STUDIES

ARIZONA POPULATION FORECASTS

It is getting increasingly difficult to forecast Arizona population for more than a few years. The state is "maturing" in that it is moving from a rapid growth state to one whose GROWTH RATE is decreasing simply due to the size of the base population. In addition, the significant in- and out-migration rates for Arizona (where for every 4 people entering the state 3 leave in a given year), and the baby boom portion of the population is beginning to shift out of high migration age ranges. While it seems reasonable to expect the growth rate will slow, it is difficult to make reliable forecasts given the uncertainty in migration rates. As an example, the Arizona Department of Economic Security forecasts a year 2000 Arizona population of 5.3 million, where the U.S Bureau of Census does not expect this level to be reached until the year 2010 (instead forecasting 4.6 million for the year 2000). This difference is shown in Figure 5.[4]

Figure 5. Arizona Population History and Forecasts



ABOR FUTURE NEEDS OF THE STATE TASK FORCE ON EDUCATION AND PUBLIC EXPECTATIONS

This ABOR subcommittee developed the still current enrollment forecasts for the Arizona universities to the year 2000. A full set of these data (three forecasts for each university) and the institution specific assumptions are in Appendix C and the summary estimates are listed in the enrollment scenarios section below (note these reports were published in 1986 but still provide the most recent official estimates for the universities).

1. All university participants agreed to use a cohort-survival computer based forecasting model (this follows the number of students promoted through each of the grades). The basic data are developed from enrollments in primary and secondary schools, community colleges, private schools, and in- and out-of-state migration. This model and the results were approved by the senior management of each Arizona university.

2. Three projections were developed: most likely, optimistic and pessimistic. Each university identified and used different assumptions for projections, but used the same basic model described above.

3. The major (all universities combined) conclusions for the most likely projection were:

a. The period of greatest increase will be 1995-2000, accounting for a 20 percent growth in headcount enrollments;

b. The period of smallest increase will be 1985-1990, accounting for 7.9 percent growth in headcount;

c. Enrollment will increase from 1985 to the year 2000 by about 46 percent for undergraduate and 47 percent for graduate, but will vary widely by institution (ASU 32 percent increase in undergraduate and 40 percent graduate; ASUW increase of 1,422 percent overall; NAU 42 percent increase in undergraduate and 60 percent in graduate; UA 29 percent in undergraduate and a 1 percent decrease in graduate);[5]

d. Nonresident enrollment will increase to 25 percent of headcount enrollment;

e. Off-campus headcount enrollment will increase 63.5 percent but varies widely by university (ASU: 108 percent, NAU: -20 percent, UA: 106 percent).

WESTERN INTERSTATE COMMISSION ON HIGHER EDUCATION (WICHE)

Early in 1988 WICHE published its third report on high school graduates (Figure 3). The report this year provides estimates of high school graduates for each state through the year 2004. For Arizona, the previous WICHE (1984) forecast was low (due to underestimating state growth); the current forecast is likely to be high because of incorporating the average of in-state migration rates of the higher years as a constant migration rate. Plane (1988) has indexed and modeled the WICHE high school graduation data for first-time college enrollment (Table 3).[6] Arizona, California, and Utah are generally enrollment growth states and New York, Illinois, and Michigan are generally enrollment loss states from the peak year (1988 or 1989) to 2000. Comparing Arizona and Illinois will show the differences in significant enrollment growth and declining enrollment states. Arizona first time university enrollment will reach its peak in fall 1989, dip to 1992, and by the year 2000 be 1.32 times the 1989 peak (a 32 percent increase). However, Illinois will peak a year earlier in 1988, decline to 1992, but not recover by the year 2000, when the high school enrollment will be 0.86 that of the 1988 peak (a 14 percent decrease).

Table 3. Projections of First-time University Students by Selected States

State	Fall 1979 Index	Fall Peak 1980s Year	Peak Index Total	Fall Trough 1990s Year	Trough Index Total	Fall 2000	Ratio 2000 to Peak Yr
AZ	110	1989	112	1992	107	148	1.32
CA	109	1988	107	1991	97	139	1.30
CO	115	1988	107	1992	93	120	1.12
KS	124	1989	105	1992	94	114	1.09
UT	104	1989	115	1990	111	155	1.35
NM	115	1988	101	1992	98	124	1.23
MI	121	1988	104	1994	84	91	0.88
TX	105	1989	111	1992	105	125	1.13
IL	121	1988	103	1992	90	89	0.86
NY	124	1988	102	1994	84	91	0.89

Index based on 100 for fall 1986. States listed are most relevant for

SPECIAL CONCERNS FOR ARIZONA

One of the most important variables is the future population growth rate of Arizona. Closely related is the in- and out-migration of school age students (at all grade levels) and the percentage of high school students electing to enter a university. See figures D2-D3 for forecasts of high school graduates for these states most important in this consideration. It seems reasonably clear that the overall population growth rate for Arizona in the next 15 years will be less than that of the previous 15 years (however, the absolute value of population increase will still be significant). It seems probable that the interstate competition for university-age students in the next 15 years will also increase. Arizona is a somewhat atypical state with respect to student flows, in that the migration of students into the state far exceeds the movement of students out of the state (see Table B4). Arizona higher education has a much greater ratio of out-of-state students to in-state students; this will increase the importance of out-of-state enrollments and other state competition in the 1990s.

The Arizona universities total enrollments as a percentage of total Arizona population increased until about 1970, declined and then increased again to 1975, and has since steadily declined (Figure B3). This decline is likely related to:

1) increased proportion of Arizona in-migrants with professional education attained elsewhere,

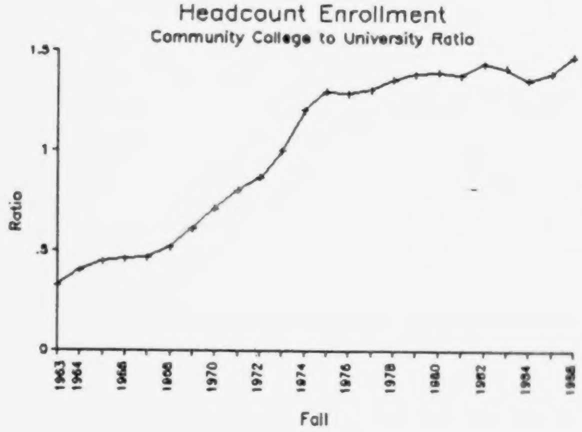
2) increased proportion of Arizona population consisting of young (less than 4) and elderly (over 65), and 3) the impact of the community college

system on university enrollments (Figure B5),

4) declines in the number of 18-24 year olds in the population.

The Arizona community colleges began significant growth in the 1960s and have influenced university growth. Beginning in 1975 the combined enrollment at the community colleges exceeded the combined enrollment of the universities (Figure B5).

Figure B5. Headcount Enrollment



The method of calculating enrollments is also an important element in developing forecasts. For example, all students will require some student services (whether off-campus, on-campus, part-time) but the instructional demand will be related to the actual student credit hours taken by the students. Table 4 indicates the ranges in headcount, depending on the definition. It is VERY important to identify separately the on- and off-campus headcount enrollments, as it is primarily the on-campus students that have major effects for the on-campus institutional character. However, many data are reported on the basis of "all students" when making institutional comparisons. This is a limitation of this working paper but for comparative purposes it is necessary.

Table 4. Headcount Enrollments in Arizona Universities, Fall 1987*

Type	ASU	ASUW	NAU	UA
On-campus Credit	39,802		11,317	32,505
Off-campus Credit	2,255	2,979	2,028	318
On-campus non-credit	-	-	-	1,462
Off-campus non-credit	-	-	-	382
Correspondence	-	-	177	1,875
Total	42,057	2,979	13,622	36,542

* Numbers are corrected for concurrent enrollments at ASU and ASUW. The ASU and NAU figures involve a different categorization of the credit/non-credit enrollments than UA, accounting for the variation in manner of presentation. Credit is defined as "degree" credit. The individual universities are listed here to emphasize the variation in reporting formats.

There are several special concerns for Arizona that complicate long-term enrollment forecasts. These are:

1. The variation in future population growth rate of the state because of the current approximately two-thirds population growth due to net in-migration shifting to a greater percentage of native born.

2. The diverging growth rates of numbers of high school graduates in some states that either provide or take Arizona high school students, and the resulting competition between these states and Arizona for students.

3. The increasing percentage of minorities in the K-12 school years, coupled with changing high school graduation rates for minorities (recently improving but still lower than for non-minorities).

4. The impacts of increased retention of already enrolled students. Approximately 35-40 percent of the freshmen class does not continue to a given school the following year; even small increases in this rate could have significant affects on university total enrollments.

5. The degree to which part-time or off-campus instruction occurs and the impact of communication technologies on effectively reducing the number of on-campus students will have consequences for both calculating or estimating the total enrollment.

6. The amount of competition which might occur with the private educational market (e.g., University of Phoenix) if the public universities do not adequately address the needs of the those type of students, they will select alternative institutions.

ASSUMPTIONS FOR ENROLLMENT ANALYSIS

This analysis of enrollment trends was done to develop a range of plausible estimates for the universities as a whole, to learn more about the circumstances that may face the Arizona universities as we move to the 21st century. Accordingly, there are two major limitations to the forecast:

1) it combines all three universities in one analysis, although some campuses will change much more than others and specific assumptions may vary widely by campus; and

2) only a few of the many possible variables were used. This was done to simplify the analysis and to show the possible range of enrollments and shape of the growth curve for the Arizona universities. This simplification was done to allow development of a broad understanding of the possible range of enrollments and to reduce the concerns of each campus relating to which assumptions are most relevant to that particular campus.

THESE GENERAL HYPOTHESES ARE:[7]

1. There will be four rates of high school graduation: a) current graduation rate (WICHE defined), b) a reduced rate based on the increasing percentage of minorities and adjusted for the historic graduation rate for make-up of minorities, and c) each of these rates further adjusted by a slowed interstate migration rate adjusted for the current age distribution.

2. Retention rates after entry to the university are given at two levels: a) current retention, and b) a 10 percent increase in retention rate.

3. Distribution of students between undergraduate and graduate is given at two rates: a) graduate as a percentage of current undergraduate held constant, and b) graduate as a constant number regardless of percentage.

4. Relationship of off-campus students to on-campus students is given at two rates: a) five-year average percentage for each campus, and b) increasing off-campus enrollment to 25 percent of total student headcount.

Many of these variables are under control of the universities (e.g., increased student support services to help retention), some are demographically controlled (e.g., high school graduation rates and interstate migration), some are due to student demand (e.g., part time students), and some are affected by state and federal initiatives (e.g., availability of financial aid). These assumptions are examples of those critical to the future enrollment levels.

UNCERTAINTIES SURROUNDING ENROLLMENT FORECASTING

There are some major uncertainties that make it unlikely that enrollment forecasting will be simple, causing the need for multiple forecasts incorporating various assumptions. In addition to the items listed in "Special Concerns for Arizona" above, some of the uncertainties for Arizona universities are:

1. Enrollment impacts of ASUW on state-wide higher education enrollments and on other universities, particularly ASU and NAU.
2. Effects of the economic cycle on the state budget, competition of the universities and state agencies for a share of the state budget, and the impact of federal and private funding on university activities.
3. Development of additional campuses of the Arizona community College system will likely produce reductions in university freshmen enrollments and subsequent increases in upper division enrollments (or reduce freshmen enrollments while holding upper division enrollments relatively constant).
4. Actions taken by universities in those states most likely to be effected by decreasing numbers of high school graduates to keep students in their home state or recruit more heavily in Arizona.
5. Impact of changes in tuition rates and financial aid for Arizona universities relative to those of other states.

ENROLLMENT SCENARIOS FOR PERIOD 1988-2000

Although the last 10 years has not been a period of significant enrollment growth for higher education in Arizona, increases in the number of high school graduates expected to start in the early 1990s and continue through the end of the century seem likely to produce significant increases in enrollment starting in the mid-1990s. It seems unlikely that this projected growth will be as large as that experienced in the 1960s, since the components of 1960s growth, e.g., the baby boom cohort, increased higher education participation rates (especially among women), and avoidance of military service, have been largely played out or are no longer operative. Enrollment growth in the late 1990s, unlike that of the 1960s, seems likely to be singularly fueled by the projected increase in the college age cohort. Although other trends may have an impact on enrollment growth in the 1960s, e.g., the increase in the proportion of part-time students and technological innovation in education, these are operating at slower rates and likely to have less impact on growth than did the other components of growth in the 1960s. Another identifiable trend, which may moderate growth in 1990s, is the increasing percentage of minorities in the college age cohort. Thus, it is necessary to examine a number of enrollment scenarios rather than relying too heavily on past experiences or simple extrapolations.

It is very important to recognize that major uncertainties exist when trying to forecast 10 or 12 years into the future. A major war, changing economic conditions or a major natural disaster, among others, could occur and have substantial effects on university enrollments. Nevertheless, for contingency planning purposes, it is necessary to develop forecasts that control for a number of identifiable conditions.

SELECTED FORECASTS

Several forecasts of enrollment for Arizona universities over the period 1985 through 2000 are displayed in Table 5 and Figure 6 (a reduced version appeared earlier as Figure 1). Considering all projections in Table 5, enrollment increases for Arizona universities over the period 1987-2000 are projected to range from approximately 16,000 to 73,000. Note that the Future Needs of the State projections fall in the mid range of the nine projections (also note that these were estimated in 1986). Although no formal probabilistic analysis was done, it is the subjective assessment of the authors that the two highest and the two lowest projections have low probability of occurrence and that the highest two of these four have the lowest probabilities. The range of enrollment increase most likely to occur over the years 1987 through 2000, based on subjective criteria, is 20,000 to 30,000 headcount. The upper end of this range is supported by Plane (1988) whose analysis of indexed migration rates and university enrollments suggests an increase of 30,000 students in Arizona over the period 1987-2000. Example D in Table 5 provides support for the lower end of the most likely range, although the authors feel that the impacts of the migration and minority assumptions are more severe in this model than they will be in actuality. In addition, the pessimistic projection (made in 1986) of the Future Needs of the State report falls in the preferred range. Thus, for the Arizona university system, we conclude that headcount enrollment increases in the range of 20,000 to 30,000 have a high probability of being realized and should be used for planning purposes.

FIGURE 6
ARIZONA ENROLLMENT FUTURES

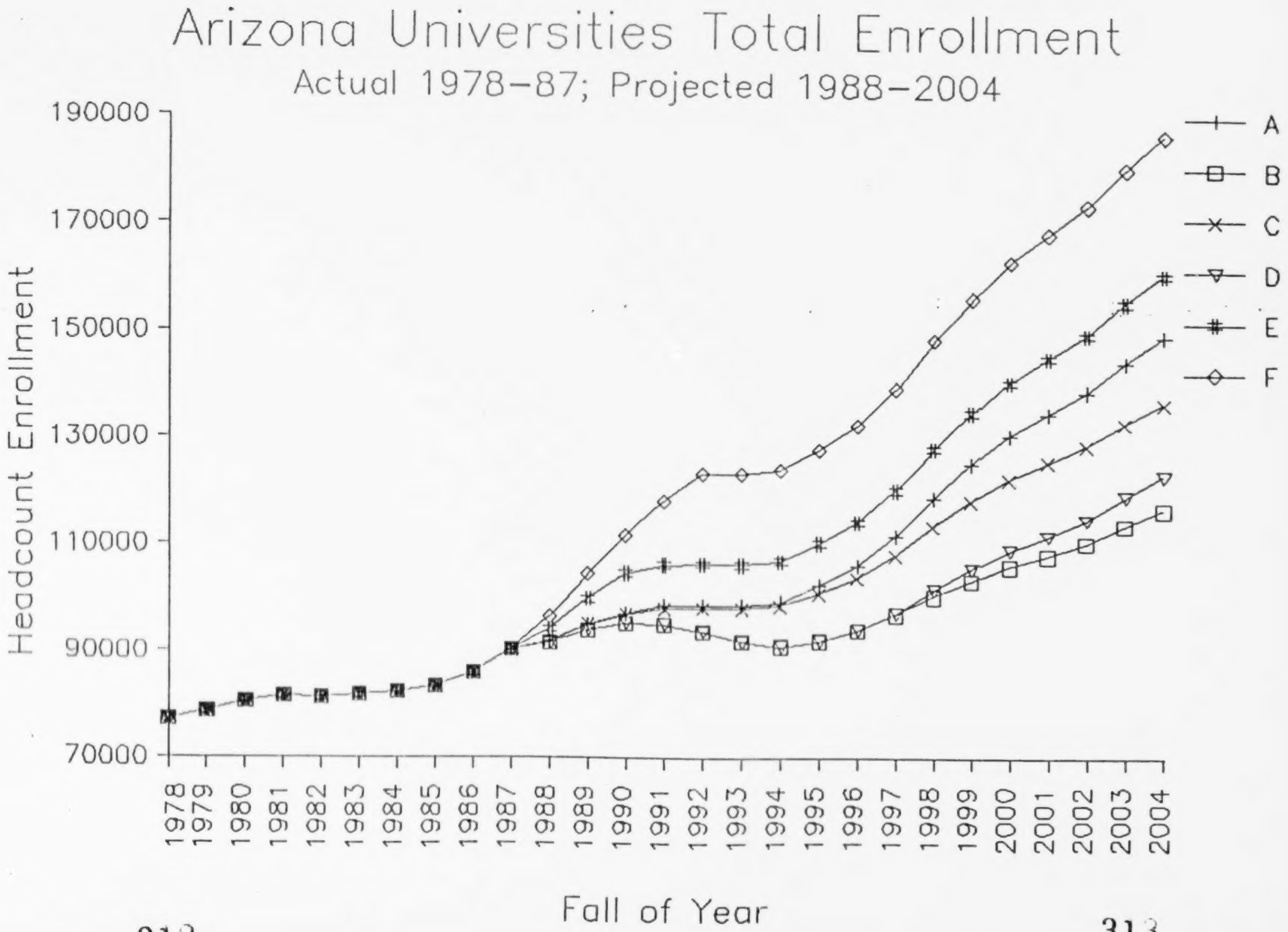


Table 5. Selected Enrollment Forecasts 1985 to 2000

Example	1985	1990	1995	2000	1985-2000 Increase
Projection A	90.098	96.904	102.138	130.449	40.351
Projection B	90.098	95.114	91.831	105.718	15.620
Projection C	90.098	96.701	100.681	122.213	32.115
Projection D	90.098	95.114	91.831	108.761	18.663
Projection E	90.098	102.719	110.054	140.558	50.460
Projection F	90.098	111.440	127.673	163.061	72.963
Optimistic*	90.098	99.774	112.455	131.406	41.308
Pessimistic*	90.098	86.339	99.168	117.018	26.920
Most Likely*	90.098	92.630	105.113	123.911	33.813

* Projections developed in 1986 by Future Needs of State Task Force on Education and Public Expectations; the terms "optimistic, pessimistic, most likely" are the terms used in the original report. See Appendix D for detailed discussion. The base year is 1987 because is most recent data; the base year for the Future Needs of the State study was 1986. The

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*** Projections developed in 1986 by Future Needs of State Task Force on Education and Public Expectations; the terms "optimistic, pessimistic, most likely" are the terms used in the original report. See Appendix D for detailed discussion. The base year is 1987 because it rpovides the most recent data; the base year for the Future Needs of the State study was 1986. The headcount for that 1985 base year was 83,547.**

IMPLICATIONS FOR ARIZONA UNIVERSITIES

1. Competition for both undergraduate and graduate students with other states is likely to increase;

2. The anticipated increases in minorities in the school and college age groups will require increased recruitment efforts and resource expenditures on the part of Arizona's universities;

3. Planning for the next five year period (1988-1993) will be much different than the following six year period (1994-2000) and will require greater management involvement than in the past;

4. Institutional resistance to change as well as the impact of new educational or communications technologies are hard to estimate but may be significant;

5. Increases in enrollment levels will undoubtedly produce a number of solutions, however, these are likely to be more successful in combination that individually.

CONFLICTING VIEWS ON ENROLLMENT GROWTH

During the course of developing this working paper, we found several viewpoints regarding enrollment that are inconsistent with generally accepted facts. Several of these are listed below as view and fact:

VIEW 1: ENROLLMENT GROWTH IS NEEDED TO INCREASE THE BUDGET OR PROGRAMS AVAILABLE

Without a growing student enrollment a university will not be able to improve its programs.

FACT 1: MOST BUDGET INCREASES COME FROM PROGRAM CHANGES NOT ENROLLMENT INCREASES

The major budget categories are: continuation (providing for inflation and capital renewal), capital planning, enrollment growth, and program changes. It is the latter category, program changes, that accounts for most of the non-inflation related budget growth in Arizona's universities. In the last five years (FY 85-89) for the combined enrollment increase budgets and program change budgets, program change accounted for 92% of the FTE (including faculty and staff) and 97% of the total budget. Several universities in other states have reduced enrollment while increasing quality, and a study of 439 public institutions show that states neither reward enrollment growth nor punish enrollment decline by adding or subtracting commensurate with enrollment changes (Leslie and Ramey 1986).

VIEW 2: INCREASES IN ENROLLMENT ONLY CREATE MARGINAL COSTS BUT PROVIDE FULL FUNDING

As additional students are added, the primary structures are already in place and therefore only small increases in costs occur.

FACT 2: ADDITIONAL COSTS ARE STEP FUNCTIONS AND REQUIRE ADDITIONAL INFRASTRUCTURE

As additional students cause a demand for additional services, new library space, or more classrooms, these facilities need to be built; this additional space then allows for some increase until a new level of support is required. The increases in "infrastructure" requests in program changes in the last two years alone are an indicator of this continual support need. During FY 88 and FY 89 [add more here to show actual amounts of infrastructure requests and the percent of total request). This has particularly been a problem for ASU due to its greater growth rate, and the need for additional space exists at all universities.

VIEW 3: OUT-OF-STATE STUDENTS PROVIDE ADDITIONAL BUDGET SUPPORT

The out-of-state student allows greater support than in-state students due to tuition payments in addition to fees.

FACT 3: BOTH IN-STATE AND OUT-OF-STATE STUDENTS ARE SUBSIDIZED BY THE STATE

The out-of-state student pays non-resident tuition in addition to the fees paid for all students. The total of tuition and fees is set at 85% of the cost of instruction; the cost of instruction includes all the instruction and student services, a portion of academic support and institutional support but not capital. Accordingly, the out-of-state student pays some amount less than the stated 85% of the cost of instruction; this difference is made up by the state. This is further complicated by the university retaining a portion of tuition (original intent in 1980) and fees (for some universities) in local accounts for revenue bond debt service; the remainder is deposited with the State Treasurer. These funds on deposit with the Treasurer are then considered when the legislature appropriates the university budgets.

VIEW 4. REDUCING OUT-OF-STATE NUMBERS WILL INCREASE STATE EDUCATION COSTS

This issue initially occurred during discussions of possible enrollment caps while at the same time increasing the number of in-state minority students. For example, if the total number of students remains constant and out-of-state students were to decrease, the state will have to pay an amount equal to the tuition payments by out-of-state students for the overall budget to remain constant. There are other considerations of out-of-state students that do not affect the university budget or cost structures. For example, the increased benefits by having additional funds expended in Arizona or the increased costs in providing services for more people.

These non-university issues are not addressed here.

FACT 4. SIMPLE COMPARISONS OBSCURE A COMPLEX ENVIRONMENT

Because of the number of out-of-state students, it would likely require a substantial increase of in-state students for the total number of students to remain constant. The fees paid by the student would presumably remain unaffected (if the process were slowly transformed and the state responded by continuing its current level of support for in-state students. If the educational need for in-state students were not met by reducing out-of-state students), the total state costs would be substantially higher than by substituting in-state for out-of-state students (see view/fact 3).

VIEW 5. WHILE THERE PROBABLY IS AN "OPTIMUM" SIZE OF AN INSTITUTION, THERE IS NO APPARENT REASON TO LIMIT GROWTH

Since the major investments already exist, additional growth is more in line with its costs.

FACT 5. IT IS NOT CLEAR WHAT AN OPTIMUM CAMPUS SIZE IS BUT THERE ARE LIMITS TO GROWTH EFFICIENCIES

While most economies of scale slow rapidly after a few thousand students, there are other less obvious indicators for institutional size. Around 13,000-20,000 there is a change and above that you either do not find economies of scale or there are diseconomies of scale. In addition, the non-economic issues suggest very large institutions are not the best for overall educational performance. For the Arizona universities, an additional concern relates to available space for future growth while maintaining the setting of a university campus (for a more detailed discussion of "optimum size" see the section titled "Is There an Optimum Size for a University?).

VIEW 6. MANY OUT-OF-STATE STUDENTS REMAIN IN ARIZONA AFTER GRADUATION

The state economy is enhanced by having out-of-state students become acquainted with Arizona and remain here to contribute to the general economy after graduation.

FACT 6. MANY OUT-OF-STATE (AND IN-STATE) STUDENTS PROBABLY LEAVE ARIZONA AFTER GRADUATION

This is a difficult subject to find clarifying data. The Task Force did a survey of alumni (analyzed by American Council on Testing). While these results are representative of the university graduates, additional work should be done to better understand this issue. The preliminary results on 1117 alumni graduating in xxx indicate that 66 percent of the formerly in-state residents still live in Arizona, and 77 percent of the formerly out-of-state residents currently live out of state.

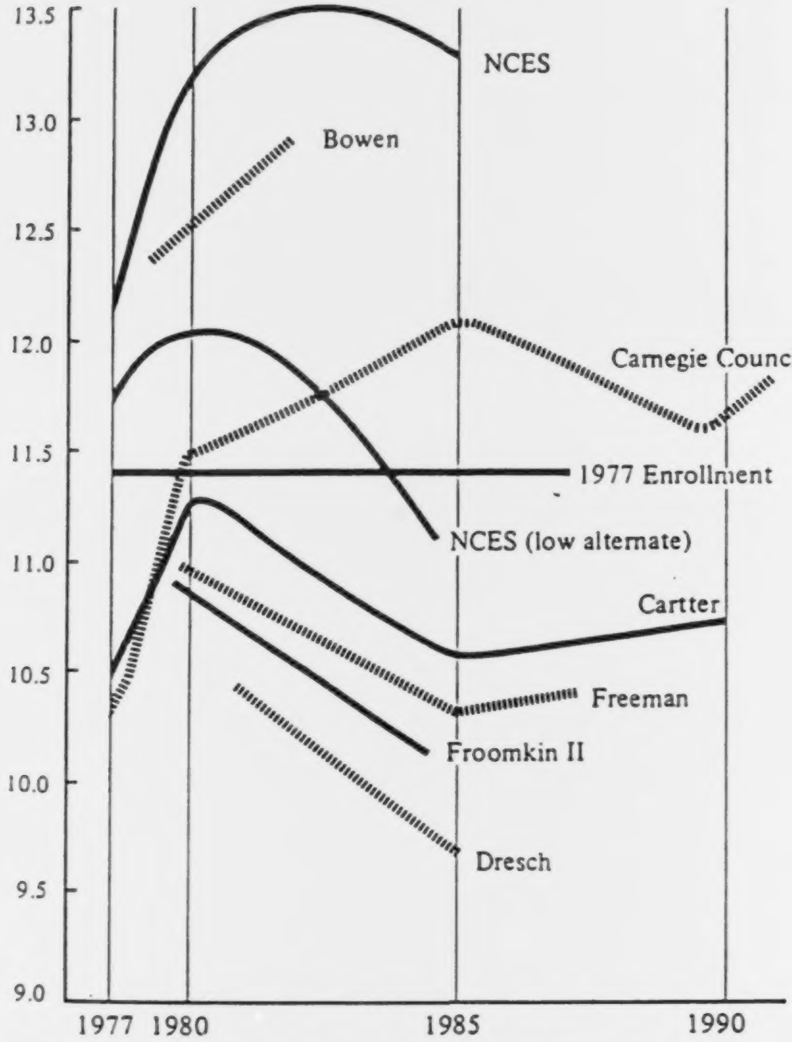
DISCUSSION

FORECASTING IS DIFFICULT

It is not easy to forecast university enrollments for more than a year ahead with any accuracy. For example, Centra (1980) analyzed a number of projections of total post-secondary enrollments for the 1980s (see Figure 7); these projections were made in 1977. As the figure indicates, large differences in projections can occur due to the variety of assumptions used, emphasis placed on underlying trends, and the perspectives of the analyst. There are a number of other examples that could be developed using institutional or systems wide estimates of university enrollments that would show equally discrepant results. Thus, it is always necessary to exercise a reasonable amount of caution when examining or discussing enrollment projections, especially those for as far as 10 or 12 years into the future. Forecasts must be realistic and the impacts of trends or assumptions must be reasonable.

Other considerations to be kept in mind when institutional projections are analyzed are noted by Kemerer and others (1982). They note that universities tend to place greater emphasis on admissions than on retention, senior university officials tend to be more optimistic regarding enrollments in public settings than they are in private, and universities in general are not adequately preparing for possible enrollment problems. They further note that it is important to maintain a focus on long term institutional viability rather than on quick fix solutions. Although this book was published in 1982, there is still considerable value to these statements.

Figure 7. Arizona Enrollment Futures (Expanded Scale)



Projections for Total Enrollment in Postsecondary Education to 1990
(in millions, relative to actual 1977 total enrollment of 11.4 million)

Note: The lines for Bowen, Freeman, Dresch, and Froomkin's second scenario are not based on actual figures but instead are an approximate illustration of their views. *Source:* Centra. 1980. Fig. 2.

ROLE OF MINORITIES, OUT-OF-STATE, AND FOREIGN STUDENTS

Because the relative proportion of minorities in the Arizona population will increase in the future, it is relevant to ask how that will affect overall enrollment and university size. Some statements regarding the universities and increases in minority students include:

- A relative slowing of in-state migration and the relative increase of minority youth will increase the relative number of minorities in the university admissions pool and may not affect the overall university enrollments.
- Each university should adopt minority recruitment and other minority program based on its geographical location, program availability, and type of student.
- Retention and transfer status of minorities is as relevant as admissions for the objective of increasing degree completion.
- Admission standards should be applied equally to all students, but special actions may be required for minorities because of different academic preparation or financial needs. These actions will require resources.

Current out-of-state enrollments at Arizona universities are in the range of 18-25 percent (depending on the method of calculation and the university), but freshman out-of-state enrollments range from 28-43 percent. Anticipated increases in minority students can be accounted for even with enrollment limitations if the increases are off-set by reductions in out-of-state students (Table B8). In addition, as the competition increases between states for a more limited pool of high school graduates in the early 1990s, major changes in out-of-state students may occur, causing additional risks of higher than average enrollments in this category. As this competitive situation develops, the relative amounts of in-state registration fees and out-of-state tuition may become an important item in the decision of which state a student might select. The Arizona rates and those of some comparative institutions are found in Table B10.

The foreign student enrollments at the Arizona universities are within the range of similar types of institutions in other states (Table B9). With the increasing internationalization of the economy, it is an advantage to have an appropriate number of foreign students, although they are usually concentrated in several highly technical fields.

IS THERE AN OPTIMUM SIZE FOR A UNIVERSITY?

This is not a question with a direct answer. There are many factors that make inter-institutional comparisons difficult (e.g., on-campus vs off-campus, part-time vs full-time, evening vs day). There are various opinions, anecdotal examples, and limited formal study. However, it is an important question for Arizona and there are some available data to help understand the basic concept.

Brinkman and Leslie (1986) have noted that there are "optimum" sizes for universities, but they are hard to define in economic terms. On the basis of their own study and summarizing the literature, they concluded that in the 13,000 to 18,000 range there is a transformation of the institution. Above that you don't really gain through economies of larger scale. There are also few institutions in the really large university class, where ASU ranks number 6 in headcount and second highest in part-time students of the largest (headcount) ten universities. Many of the very large enrollment campuses have substantial land areas and can maintain the learning setting better than the more compact Arizona universities. Institutional size is heavily skewed to the very small college. Comparing fall 1986 enrollments, only 10 percent of the institutions are 10,000 headcount or above; only 3 percent are over 20,000, and less than two percent are over 30,000 (30 institutions).[8] The top 10 universities (all are public) are listed in Table 6.

Table 6. Ten Public Universities with Greatest Head Count Enrollment (Fall 1986)

University	Headcount	FTE	Percent Part-time
U Minnesota	63,067	44,573	44.0
Ohio State	53,199	46,770	18.1
U Texas, Austin	47,838	43,392	13.9
U Wisconsin	45,050	40,155	16.3
Michigan State	42,746	37,251	19.3
Arizona State	40,529	30,658	36.5
U Maryland	38,679	32,118	25.4
U Illinois	35,997	33,905	8.7
Penn State	35,699	32,813	12.1
Texas A&M	35,675	32,820	12.0

Source: NCHEMS. Universities with branch campuses have only the main campus listed.

Arizona universities cannot accommodate the likely 20,000 - 30,000 headcount increases in the next 12 years and also maintain the quality of their educational settings approximately as they are today.[9] Other universities have decided to downsize in the last few years and several have had enrollment limits for a number of years (e.g., University of California at Berkeley and Los Angeles).[10]

There is no clear breakpoint where institutions move from small to medium to large to very large. However, Brinkman and Leslie (1986) on purely economic considerations reinforce what seems to be a feeling that as you move through about the 15,000 level, the institutional character changes; NAU is presently at 11,417 total on-campus headcount but is 13,445 total (1987).

The next break is more difficult to define. Brinkman found after about 15,000 the economies of scale are no longer significant, and in some cases begin to be diseconomies of scale. The character of the campus begins to change when the very large student body develops. There is some anecdotal evidence to suggest this level is in the 30,000 range, and is partially supported by those choosing to cap or downsize focus on the 30,000 number as a general target.[11]

In our Task Force staff interviews, we found that there is some concern ASU may already be too large, NAU is approaching a critical size that will change its character if exceeded, and UA is about right at its current size. Furthermore, NAU has publicly indicated this concern and interest in remaining the type of institution it is currently, but the other two universities have not made public statements regrading overall enrollment caps or optimum sizes. It should be noted that there are de facto enrollment limitations at all Arizona universities in the form of entrance requirements for individual colleges within the university.[12]

There are several universities of wide reputation that provide useful comparisons in terms of enrollment size (Table 7).

Table 7. Enrollment of Selected Universities*

University	Total Headcount	Percent Part-time	Percent Graduate
Arizona State	40,223	33.9	13.5
U Arizona	30,460	26.4	22.0
Northern Arizona U	-	-	-
U Calif,Los Angeles	34,751	7.9	23.0
U Washington	34,308	22.5	20.9
San Diego State	32,494	34.7	11.2
U Houston	31,114	49.3	18.7
U Calif, Berkeley	30,009	8.9	25.9
U New Mexico	25,690	44.4	14.8
San Jose State	25,081	40.3	10.7
U Utah	24,911	33.0	12.9
U Colorado	22,191	11.1	16.7
U North Carolina	21,812	15.9	20.3

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* From top 100 universities in enrollment for Fall 1983 from National Center for Education Statistics (more recent statistics for full comparison were not easily available).

ALTERNATIVE GROWTH OPTIONS

The Arizona universities are all in the "large" category (top 10 percent in the country in headcount enrollment). In the Future Needs of the State Report enrollment projections (1986 report), ASU estimated a year 2000 most likely headcount of 50,651; this would likely place ASU as the third largest campus in the country. Thus, overall campus size is an important issue facing the Arizona universities in the next decade or so. An example of how the expected 20,000-30,000 headcount enrollments will likely be distributed in the state is shown in Table 8.

Table 8. Primary Arizona Growth Areas (in 1000)*

Year	Maricopa		Pima		--- Enrollment	Increases ---
	#	%	#	%	Maricopa % of 20-30,000	Pima % of 20-30,000
1985	1,838	57.5	624	19.5		
1990	2,262	58.1	735	18.9		
1995	2,792	60.1	853	18.4		
2000	3,252	61.0	974	18.2	12.2-18.3	3.6-5.5

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* Note these estimates are from AZ Department of Economic Security. The Statewide population growth for 2000 is 700,000 greater than the US Bureau of Census, so these estimates are intended to show percent distribution rather than absolute values. The Maricopa/Pima percent of 20-30,000 is the estimated increased size of the university enrollments for 1985-2000.

The expected year 2000 increase in Maricopa County enrollment of 12,200 to 18,300 is probably too great for any one campus.[13] However, the role of the community colleges (including recently or planned campuses) and on-campus vs off-campus enrollments will have a significant effect on these estimates.

In summary, the options included in this limited evaluation and the conclusion for each are:

1. INCREASE ENROLLMENTS AT MAIN CAMPUS.

This seems to be a realistic option only for NAU since ASU is already approaching a maximum and U of A is currently at an optimum size. This option should only be implemented after careful planning efforts by the Arizona Board of Regents identify maximum enrollment targets for each university and assess the likely impacts of enrollment increases on student life (broadly defined) and the surrounding communities.

2. DIVERT MORE FRESHMAN STUDENTS TO COMMUNITY COLLEGES.

This is in effect done in Maricopa County, causing ASU to have a larger upper division than lower division, and for ASUW to be designated as an upper division campus. While this could be implemented in the case of UA and NAU, it would change the character of these institutions significantly.

3. DEVELOP OFF-CAMPUS CENTERS OF LIMITED SIZE IN MULTIPLE LOCATIONS.

Relatively small off-campus centers could be expanded in the Phoenix area and initiated in the Tucson area. However, these types of centers usually have limited programs and are designed to accommodate part-time students and, thus, they are unlikely to relieve pressures on the main campuses to provide places for students desiring full-time study.

4. ESTABLISH A SECOND TIER OF UNIVERSITIES.

Other state universities have done this with mixed success. The resource demands on the state for a possible additional governing board and the likely political demand for multiple campuses (geographically dispersed) would undoubtedly be enormous. Perhaps this is the least desirable of the options.

5. ESTABLISH A FOURTH UNIVERSITY UNDER THE REGENTS

This could be done anywhere in the state for a residential campus. The demands, however, are more likely to be for a campus located in the Phoenix metropolitan area. A university offering the full range of programs would duplicate expensive programs and cause major resource expenditures.

6. USE OF ELECTRONIC TECHNOLOGY FOR OFF-CAMPUS INSTRUCTION.

It is difficult to estimate the impact of this option. It seems clear that many courses could be taught in this manner, but this technology is unlikely to be widely implemented within the 12-year period under discussion; to effect any major diversions of "traditional" university students into an "electronic campus" will take time. However, an increasing number of students are anticipated to be "non-traditional."

7. DEVELOP COOPERATIVE AGREEMENTS WITH OTHER STATES TO EDUCATE ARIZONA RESIDENTS.

It is possible that states with excess higher education capacity, due to a decline int he number of high school graduates, may find it attractive to negotiate WICHE-like cooperative agreements to accept students from states, such as Arizona, with excess student demand. Such agreements have been negotiated in the past under the auspices of WICHE but have dealt mainly with high cost, low demand programs such as dentistry and veterinary medicine. It might be possible for Arizona to negotiate agreements for undergraduate education that would be more cost affective than building new facilities to handle increased demand.

8. BUILD SELECTED BRANCH CAMPUSES OF EXISTING UNIVERSITIES. A branch campus structure (modeled after ASUW) would maintain the major management structure of the main campus and undoubtedly focus on selective programs. This approach would allow additional campuses to be built with fewer resources than other options.

While several of these options should be pursued simultaneously, consideration needs to be given to the option(s) that will provide the type and quality of education for the estimated 20-30,000 new students likely to matriculate at

Arizona universities between 1988 and 2000.

CONCLUSIONS

1. The Arizona universities will fare better than many universities during the next 5-7 year period of national decline in high school graduates. However, with changing demographic conditions in Arizona and national economic uncertainty, care still needs to be taken to avoid the simple straight line projections of future enrollment.

2. The real costs of increased enrollment are not adequately provided by additional state funding. Such enrollment does provide a sense of "good feeling" about the desirability of the university and provides faculty members to compensate for the increased teaching responsibilities of increased enrollment, but is requires additional funding over that supplies in the "enrollment" gain formula funding (e.g., through program changes).

3. Although the range of possible enrollments for Arizona universities is rather large, only a small number of the variables contributing to the variability can be controlled by the institutions. Other variables, e.g., changing student demand as well as national and state demographic trends, are not amenable to institutional control and seem likely to produce an enrollment growth of approximately 20 to 30 thousand students over the period 1988 to 2000.

4. The proportion of out-of-state students should be further evaluated relative to the potential vulnerability of overall enrollments if increased interstate competition should occur in the mid 1990s.

5. Off-campus enrollment and part-time enrollment patterns confuse enrollment forecasting. There is no clearly understood process to fully identify student services or academic program costs for off-campus vs on-campus students. As trends are likely to continue for both of these categories, the apparent headcount enrollment may increase markedly. Enrollment reporting forms should be changed where necessary to clearly identify off-campus, on-campus full-time, and on-campus part-time enrollments by institution in order to allow for development of dependable and realistic enrollment forecasts.

6. The issue of optimum campus size and the number of branch campuses is highly relevant at this time and needs additional study.

7. There are two time periods for consideration in enrollment planning. The next 5-7 years (1988-1995) is a period of high uncertainty and requires special monitoring; the last five years of this century (1995-2000) are more clearly a period of continuous growth, but will be affected by what occurs in the earlier period. The strategic planning processes should take into consideration the different strategies necessary to deal with these two distinct periods.

8. While the universities have considered the relative mix of undergraduate to graduate, on-campus to off-campus, and full-time to part-time students, there is no clearly identified series of goals on how to operationalize those interests. Additional studies are needed to better understand the relative student mix and total size of the universities.

9. The relative impact of electronic communications capabilities in the next 12 years to alter the traditional teaching approach and student location will affect the enrollment maxima of the universities. But while many of the these effects can be listed, they are difficult to quantify.

RECOMMENDATIONS

- THE ARIZONA BOARD OF REGENTS SHOULD ALTER THE FORM OF ITS REPORT ON STUDENT ENROLLMENT SO THAT VARIOUS TYPES OF ENROLLMENTS ARE CLEARLY IDENTIFIED.

Since data on part-time, full-time, on-campus, and off-campus enrollments are critical for enrollment forecasting, it is necessary to separate them for analysis. Furthermore, enrollments for main campuses, branch campuses, major off-campus centers, and an aggregate of other off-campus offerings should be reported separately, and duplicated and unduplicated headcount as well as FTE data should be reported for each entity. Enrollment data reported in this manner would allow the Board of Regents to more closely monitor enrollment growth at the various campuses and to make better informed decisions regarding campus size and operation.

- EACH UNIVERSITY SHOULD DEVELOP A SET OF AT LEAST THREE ENROLLMENT PROJECTIONS THAT TAKE INTO CONSIDERATION ANTICIPATED ENVIRONMENTAL CONDITIONS OVER THE PLANNING PERIOD AND THE UNIVERSITY'S BOARD APPROVED ROLE, SCOPE, AND MISSION.

These projections should be part of the Board of Regents strategic planning process, and the projection methodology should be approved by Board staff and the assumptions used should be clearly identified. The enrollment forecasts should be more completely developed along the lines of some of the uncertainties listed in this working paper. It is not too soon to determine the types of institutions necessary to meet year 2000 student demands. The shape of the enrollment curve is such that we have about 7-10 years before major enrollment increases are likely; given the development process for major campus facilities (including possible branch campuses), this allows time to fully debate the options and take action in advance of forced change.

- NEW EDUCATIONAL DELIVERY SYSTEMS SHOULD BE INVESTIGATED TO SLOW THE DEMAND FOR ON-CAMPUS ENROLLMENT GROWTH.

Given the high percentage of part-time students and the increasing demands for off-campus education, the use of alternative educational delivery systems should be actively pursued (e.g., delivery by telecommunications technology).

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APPENDICES

327

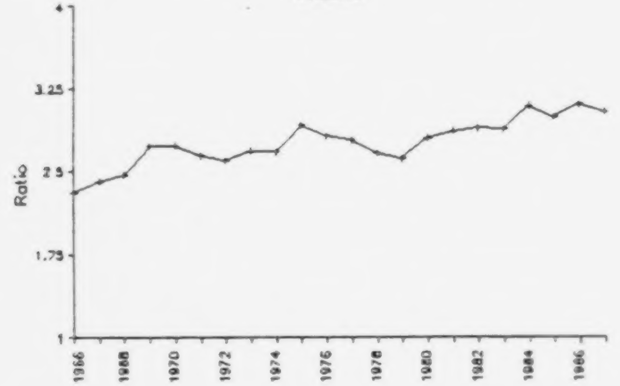
Appendix A. Enrollment Management

Enrollment management entails more than just recruiting students. Indeed, if properly constituted, enrollment management involves university administrators, faculty, staff, students, and alumni in a carefully coordinated set of interrelated programs culminating in the realization of the university's goals as specified in its mission statement. Programs critical to effective enrollment management are marketing, recruiting, advising, academic assistance, financial assistance, orientation, retention, recreation, and student and alumni research.

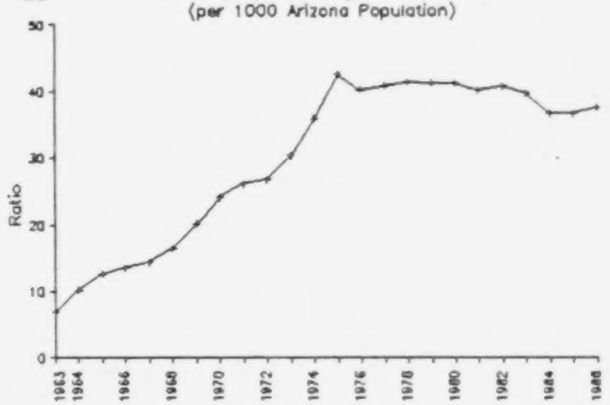
In addition to the instructional and recreational aspects of student life on campus, enrollment management also considers the cultural and environmental experiences of students. Thus, enrollment management is concerned with the "total" educational experience of the student and not just the academic side. How universities structure their enrollment management programs over the next decade will largely determine the quality of student life on their campuses and have an impact on the interinstitutional competition for students.

Appendix B. National and State Historical Trend Data

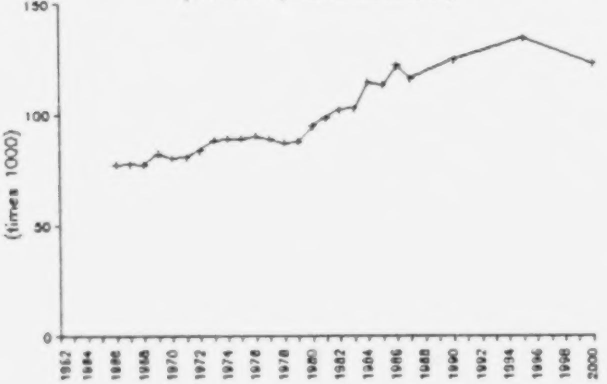
This appendix contains a variety of trends relating to higher education nationally and in Arizona. The results are summarized in the main body of the report and the details are placed here for reference


B1 Ratio High School Graduates to University Enroll

Arizona

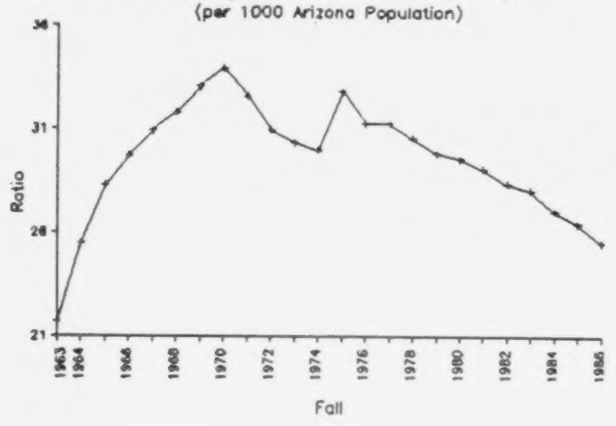

B2 Community College Enrollment

(per 1000 Arizona Population)

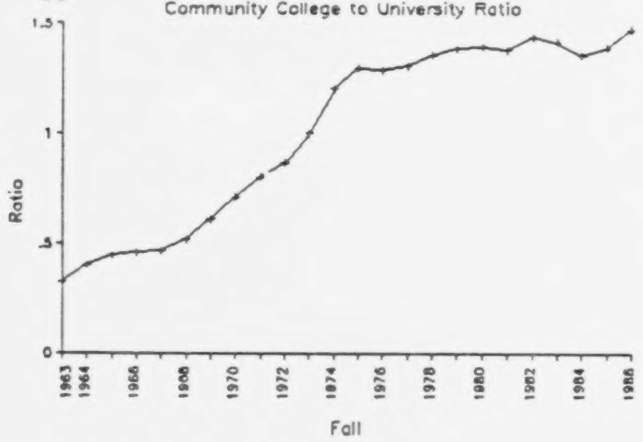

B3 Ratio AZ Population to High School Graduates

(Forecast by WICHI calculation)

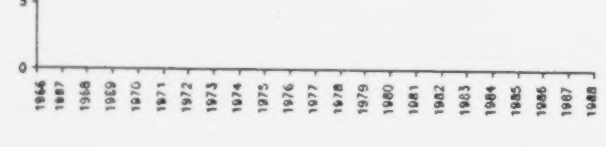
B4 University Headcount Enrollment
(per 1000 Arizona Population)



B5 Headcount Enrollment
Community College to University Ratio



B6 Enrollments of Arizona Universities
Percent Graduate (Headcount)



Appendix C. Future Needs of the State Report

The Future Needs of the State Work Group developed a report on enrollment projections through the year 2000 in 1986. Three levels were projected through the year 2000, based on most likely, optimistic, or pessimistic scenarios. The assumptions were different for each campus and the results were reviewed by senior management at each university. Three figures from that report are reproduced here: Figure C1 Higher Education Enrollment in Arizona; Figure C2 Public University Enrollment by type of estimate, and Figure C3 Public University Enrollment by University. Three tables are also reproduced here: Table C1 Projected Public University FTE Enrollments,"[14] and Table C2 Projected Enrollments for Most Likely Assumptions. In addition, all assumptions for each university are reproduced.

Figure C1. Public University Enrollment 1985-2000 (FTE)

Figure C2. Public University Enrollment by Type of Estimate

Figure C3. Public University Enrollment by University

Table C1. Projected Higher Education Enrollment in Arizona

Table C2. Projected Enrollments Using Three Assumptions.

Table C3. Listing of Individual University Assumptions.

Table C1. Projected Higher Education Enrollment in Arizona

PROJECTED ARIZONA PUBLIC UNIVERSITY ENROLLMENTS
Full-Time Equivalent Students

1985 Actual, 1990-2000 Projected

	Actual 1985	1990	1995	2000
UNIVERSITY OF ARIZONA				
Optimistic	25,411	27,774	28,344	33,283
Most Likely	25,411	26,633	26,899	31,595
Pessimistic	25,411	25,695	25,834	30,293
ARIZONA STATE UNIVERSITY				
Optimistic	29,646	31,495	36,042	41,774
Most Likely	29,646	30,290	34,194	39,508
Pessimistic	29,646	28,576	31,504	35,743
ASU-WEST				
Optimistic	695	5,007	10,019	10,913
Most Likely	695	3,148	7,827	10,579
Pessimistic	695	2,794	7,191	10,332
NORTHERN ARIZONA UNIVERSITY				
Optimistic	10,319	12,086	12,478	16,371
Most Likely	10,319	11,242	11,600	14,361
Pessimistic	10,319	10,399	10,721	13,736
UNIVERSITY SYSTEM TOTAL				
Optimistic	66,071	76,362	86,883	102,341
Most Likely	66,071	71,313	80,520	96,543
Pessimistic	66,071	67,464	75,250	90,104

Table C2. Projected Enrollments Using Three Assumptions.

TABLE III-A

PROJECTED ARIZONA PUBLIC UNIVERSITY ENROLLMENTS
Using "Most Likely" Assumptions

Headcount and FTE Students by Undergraduate and Graduate Levels
1995 Actual, 1990-2000 Projected

	Actual 1985		1990		1995		2000	
	Headcount	FTE	Headcount	FTE	Headcount	FTE	Headcount	FTE
UNIVERSITY OF ARIZONA								
Undergraduate	23,111	21,232	24,429	22,563	24,717	22,829	29,801	27,525
Graduate	7,263	4,179	7,153	4,070	7,158	4,070	7,158	4,070
TOTAL	30,374	25,411	31,587	26,633	31,875	26,899	36,959	31,595
ARIZONA STATE UNIVERSITY*								
Undergraduate	29,043	25,239	29,514	25,722	33,098	28,911	38,011	33,332
Graduate	8,986	4,407	9,320	4,568	10,740	5,283	12,640	6,176
TOTAL	38,029	29,646	38,834	30,290	43,833	34,194	50,651	39,508
ASU WEST								
Undergraduate	1,305	412	6,806	2,361	12,087	5,870	14,043	7,934
Graduate	1,224	283	1,909	787	3,390	1,957	4,681	2,645
TOTAL	2,529	695	8,715	3,148	15,477	7,827	18,724	10,579
NORTHERN ARIZONA UNIVERSITY								
Undergraduate	9,852	9,089	10,175	9,526	10,499	9,829	13,773	12,894
Graduate	2,763	1,230	3,319	1,716	3,424	1,771	3,804	1,967
TOTAL	12,615	10,319	13,494	11,242	13,923	11,600	17,577	14,861
UNIVERSITY SYSTEM TOTAL								
Undergraduate	63,311	55,972	70,924	60,172	80,401	67,439	95,628	81,685
Graduate	20,236	10,099	21,706	11,141	24,712	13,081	28,283	14,858
TOTAL	83,547	66,071	92,630	71,313	105,113	80,520	123,911	96,543

* Headcount for ASU main campus does not include students concurrently enrolled at main campus and ASU West.

Table C3. Listing of Individual University Assumptions.

UNIVERSITY OF ARIZONA

Assumptions for the Most Likely Enrollment Projections

I. New Freshmen

A. Pima County high school graduates will matriculate at the U of A at the same weighted-average rate (24.94%) as they have over the past five years.

B. High school graduates of all other Arizona counties will matriculate at the same weighted-average rate (5.83%) as they have over the past five years.

C. The number of out-of-state freshmen will increase slightly over the weighted-average level of the past five years.

II. Other Undergraduate Students

A. Year-to-year retention rates will increase over those experienced in the past five years.

B. Grade level weighted-average transfer-in rates will remain the same as over the past five years.

III. Graduate Students

A. The number of graduate students will remain at the same weighted-average level as over the past five years.

B. Research funds to support graduate students will decrease from the average level experienced over the past five years.

IV. Demographic and Other

A. Student financial aid funds will decrease moderately over the projection period.

B. Continuing education enrollment will increase as the number of 30 to 54 year-olds increases over the next 15 years.

C. Tuition prices will increase at a rate not greater than that experienced over the past five years.

D. Recruitment efforts will increase, especially those targeted on minority groups.

E. The number of 18 year-olds will increase at the rate predicted by the Arizona Department of Economic Security.

F. Enrollment of students from other states will increase slightly from that experienced, on average, over the past five years.

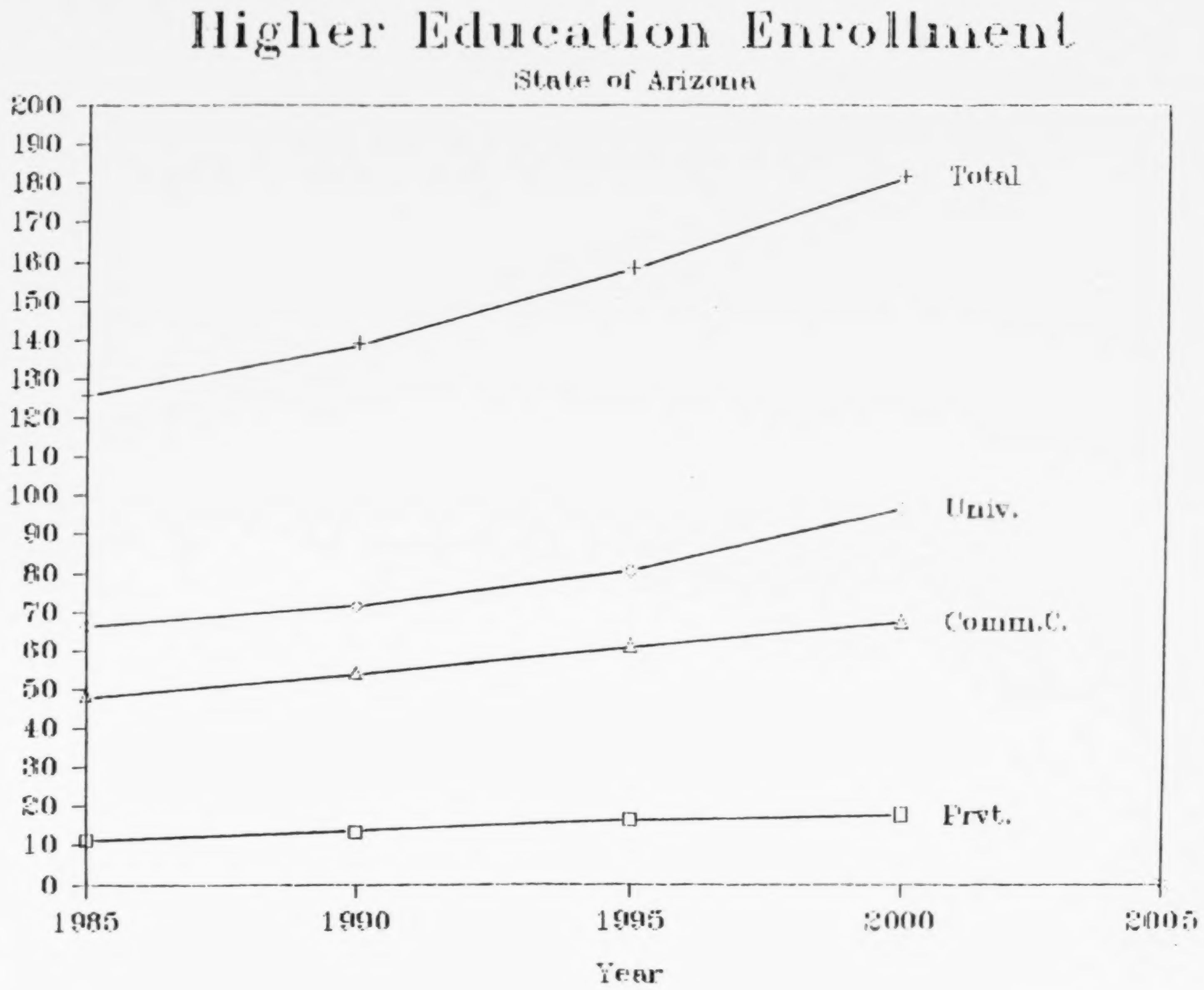


CHART 1

Figure C1. Public University Enrollment 1985-2000 (FTE)

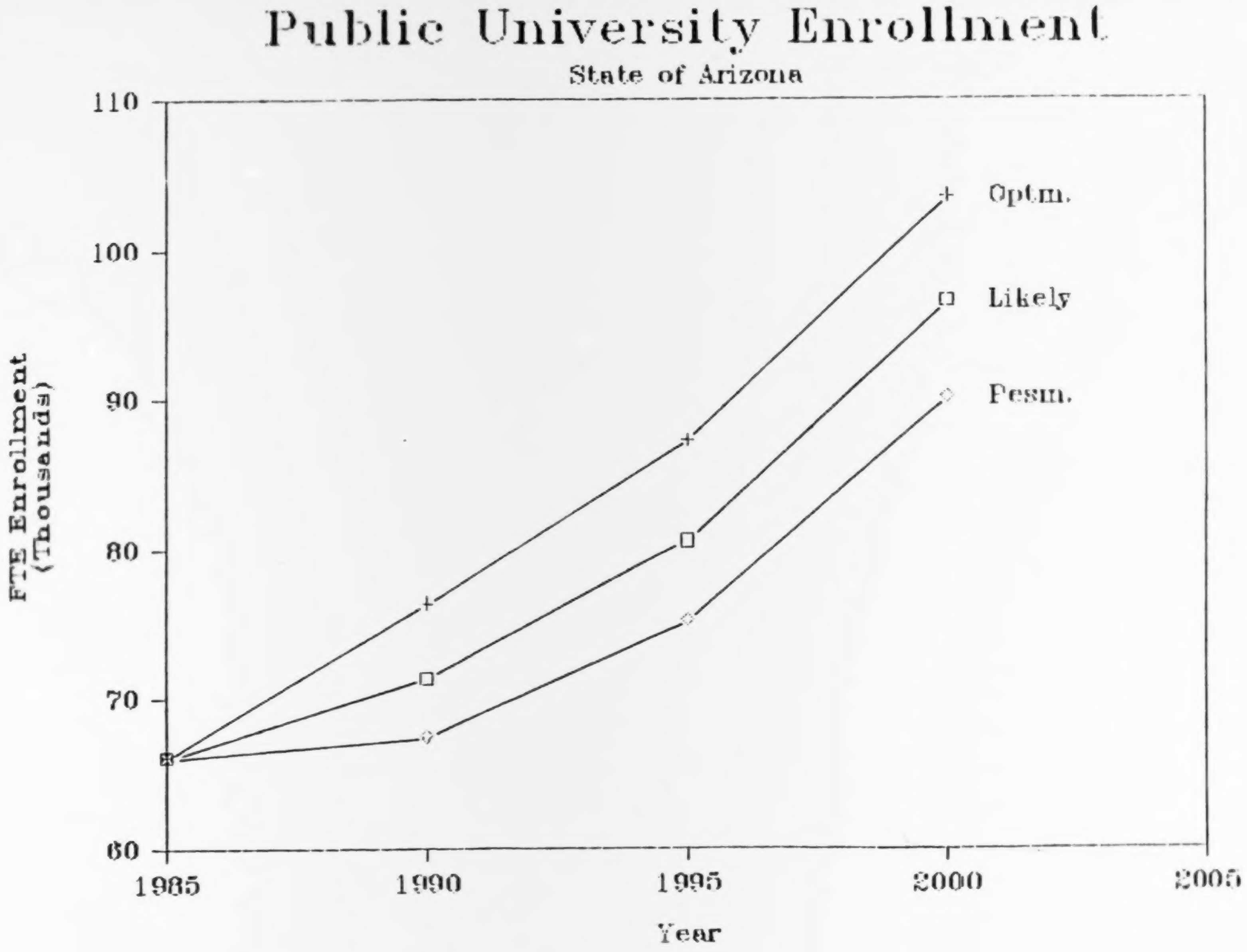


CHART 2

Figure C2. Public University Enrollment by Type of Estimate

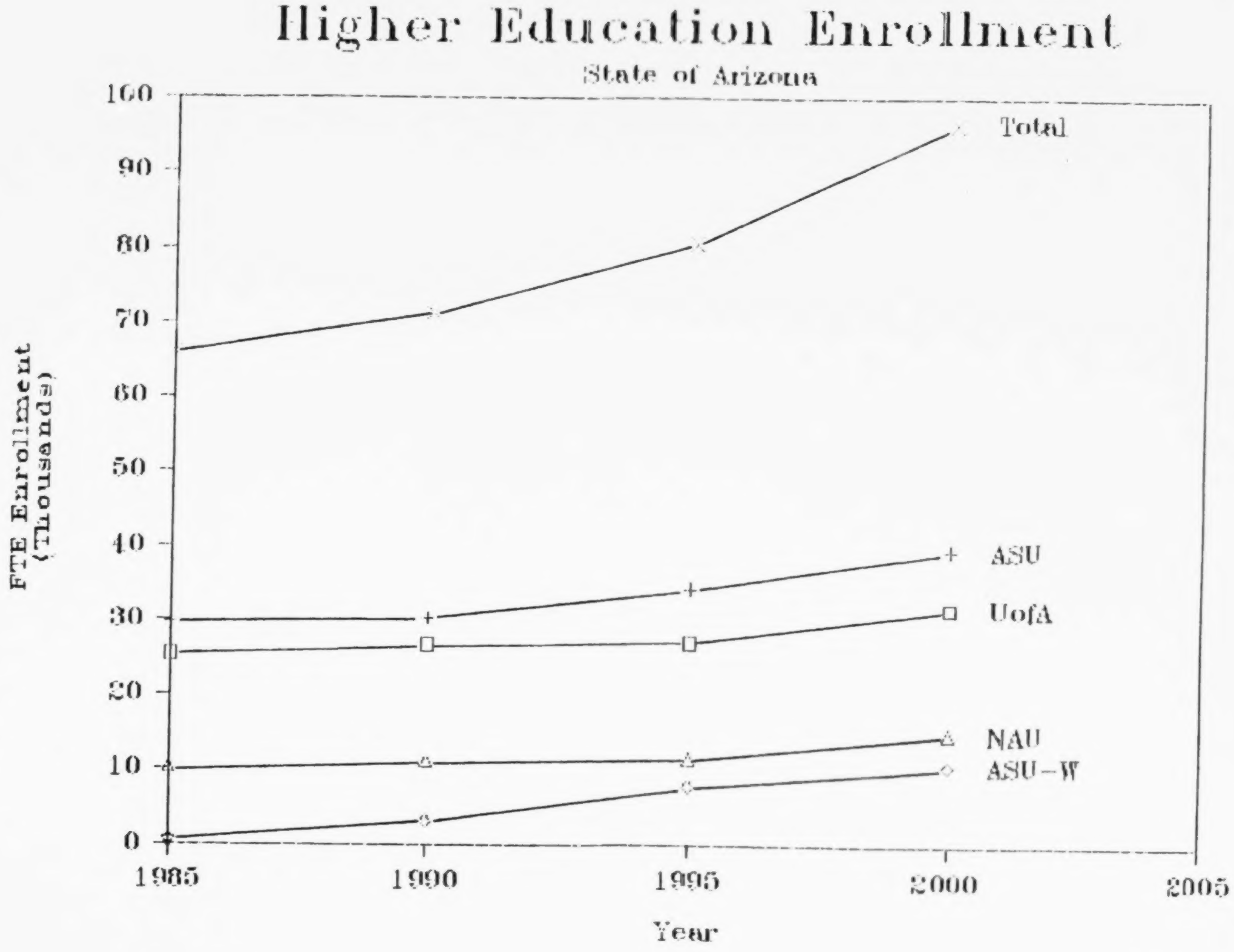


Figure C3. Public University Enrollment by University

CHART 3

Appendix D. Revisited Enrollment Forecasts

The overall enrollment forecasts are shown in Figure D1 (this is an expanded version of Figure 1) and include six sets of assumptions (presented in Table D1). The high school graduation trends in those states where students either leave or come to Arizona for higher education are shown in Table D2 and D3. These states are California, Colorado, New York, Illinois, Texas, Michigan, Kansas, New Mexico, and Utah.

Table D1. Assumptions for WICHE Based Arizona Forecast (1988)

The Base Model. See the model labeled "Market Share Model A." The columns of interest are labeled Total AZ Grades, three university's undergraduate enrollment, High school Grade 5 Year Weighted Average (most recent year weighted 1.5 and most remote year weighted 0.5 all others weighted 1.0), (2)/(3a) which is the ratio of UG enroll to weighted HS grades, 3 Us GR Enroll, (4)/(2) which is the ratio of graduate HC to undergrad HC, and the rightmost column which contains the projected total enrollment. All entries through 1987 are actual numbers. The number used to generate the undergrad projection is in column "(2)/(3a)," this is a 2 year weighted average with most recent year weighted 2.0; for 1988 the figure is 2.414445. This ratio is multiplied by weighted HS graduates to produce the total undergraduate enrollment (see column "3 Us UG Enroll"). The graduate/undergraduate ratio is produced similarly (see column "(4)/(2)"); this ratio is multiplied by undergraduate enrollment to produce projected graduate HC (see column "(4)" for the 1988 and subsequent years. Total projected enrollments are obviously the sum of the undergraduate and graduate columns.

Market Share Model A -- This model used the WICHE HS graduate projections as a base and the ratios as described in the paragraph above to produce its projections. This is the base model.

Note: only changes from the base model will be noted in the descriptions that follow.

Market Share Model B -- Three changes were made in this model. First, high school graduate projections were based on grade-to-grade promotion percentages from the period 1974 through 1977, a period of recession in Arizona. Second, graduation rates were further adjusted for the promotion rates of Hispanics and Indians to account for the increases in the number of these racial/ethnic groups in the school populations in the future (see attached sheet for calculations). Third and last, graduate enrollment was capped at 23,000; it was allowed to increase naturally until it reached the cap in 1997.

Market Share Model C -- The only change, from the base model, was to cap graduate enrollment at 23,000; this limit was reached in 1990.

Market Share Model D -- This model incorporated the 1974-1977 percentages and the Hispanics/Indian adjustment. All other parameters were not changed.

Market Share Model E -- The only change in this model was the adjustment for the 10 percent increase in retention.

Market Share Model F -- The change to this model was the adjustment for the 25 percent increase in headcount for off-campus enrollment.

Additional information is given in three figures:

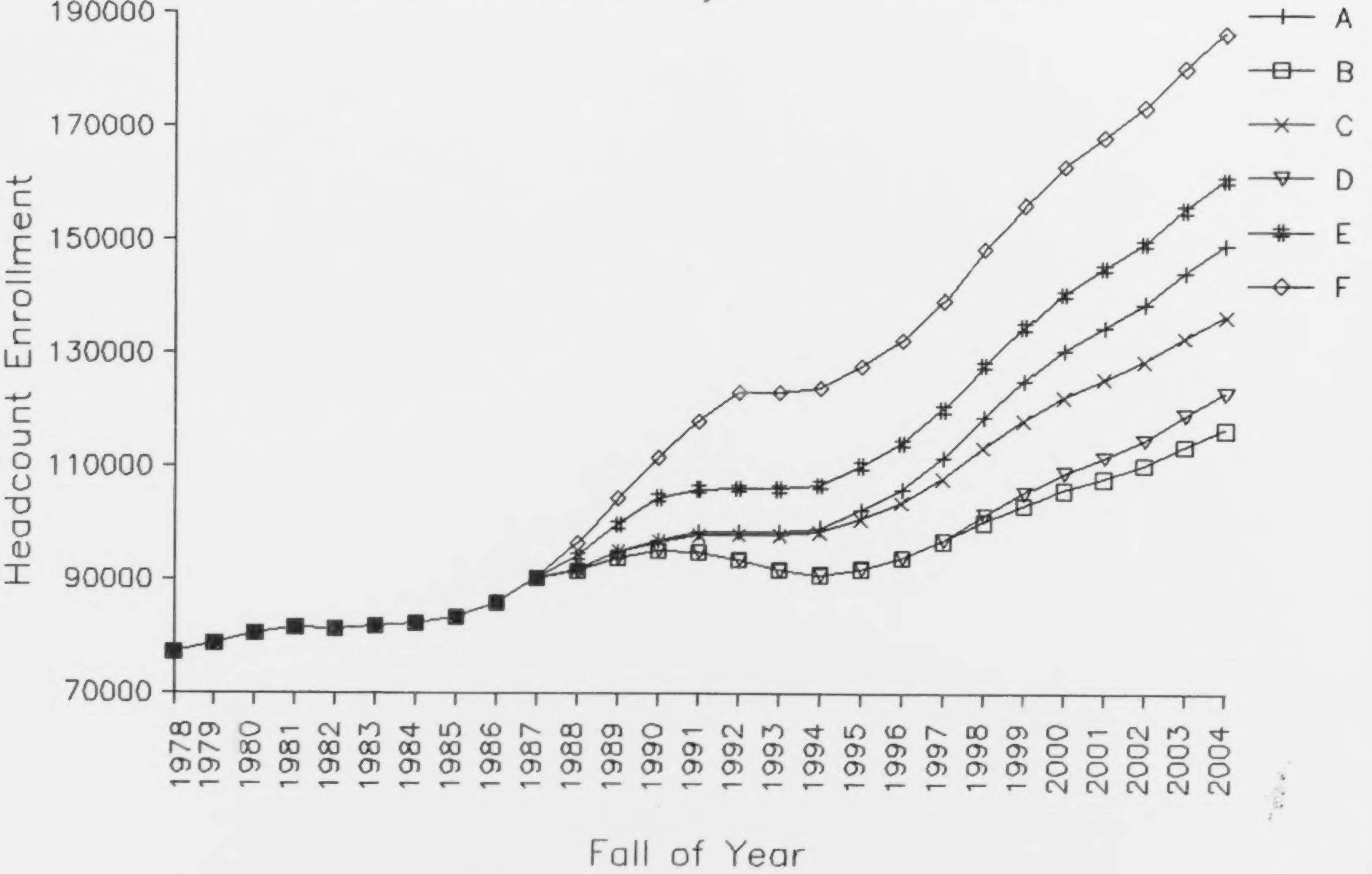
Figure D1. Arizona Universities Total Enrollment

Figure D2. Public High School Grads in Selected States A

Figure D3. Public High School Grads in Selected States B

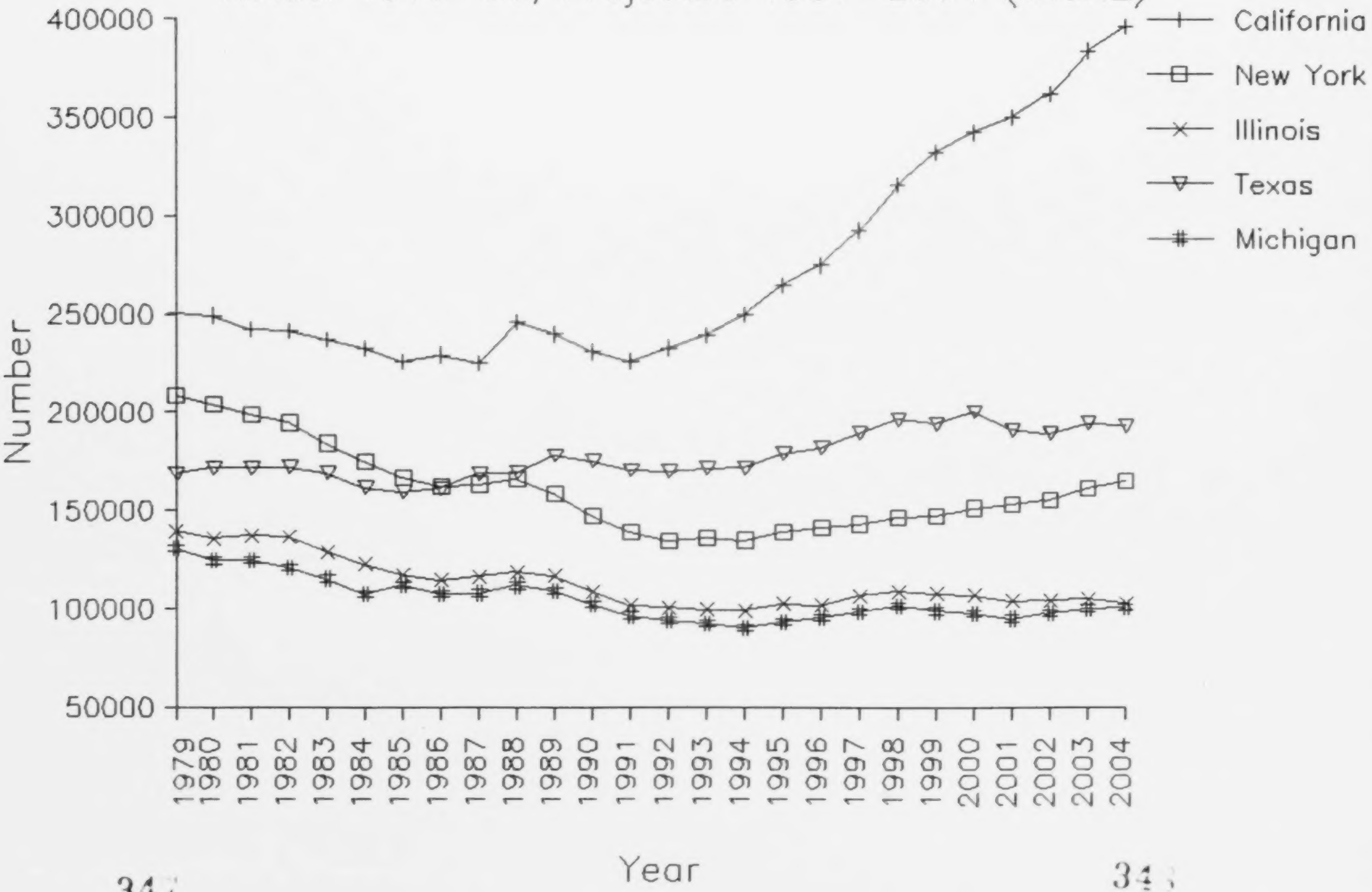
Arizona Universities Total Enrollment

Actual 1978–87; Projected 1988–2004



Public HS Grads in Selected States -- A

Actual 1979-86; Projected 1987-2004 (WICHE)



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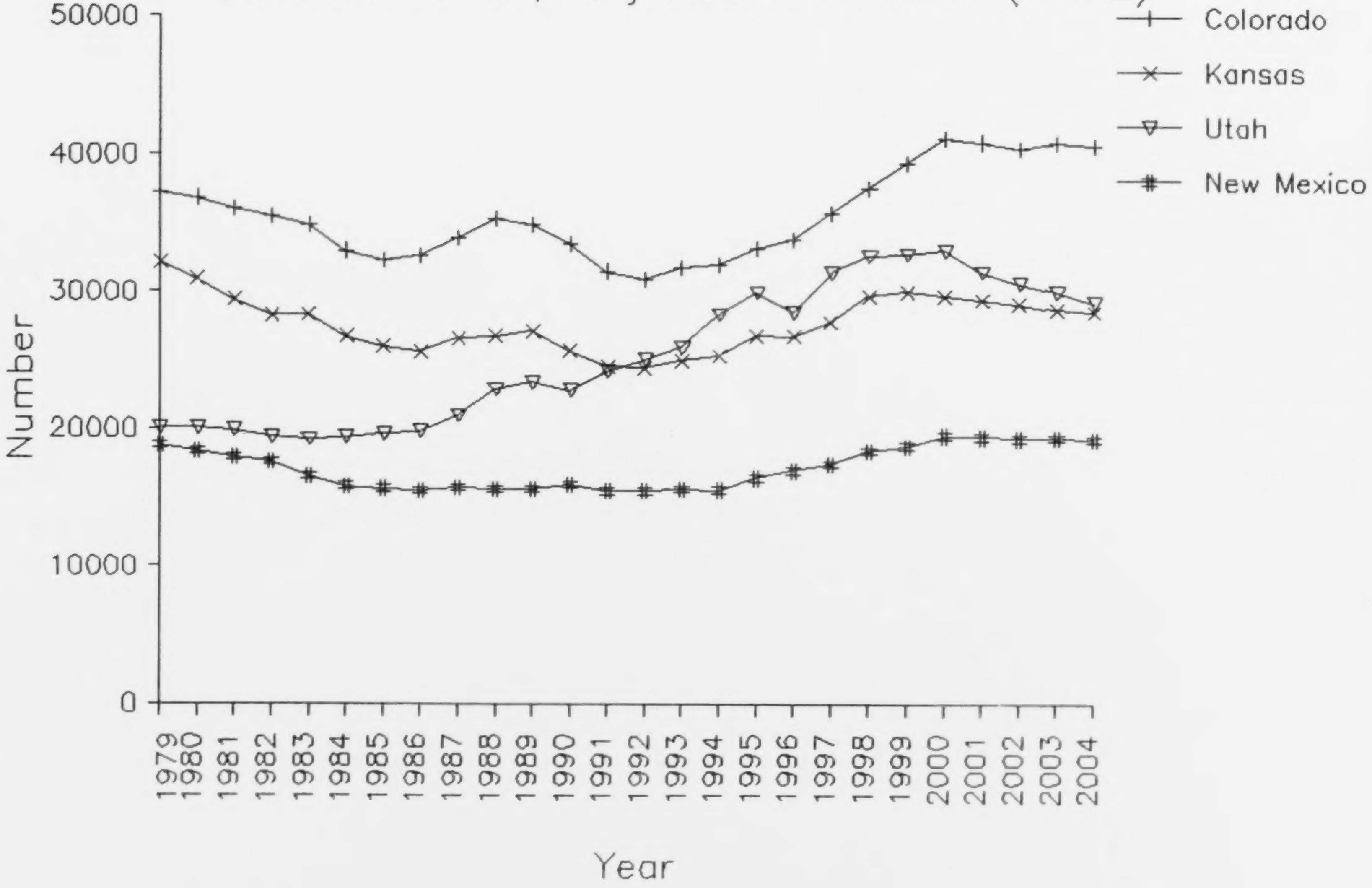

Public HS Grads in Selected States -- B

Actual 1979-86; Projected 1987-2004 (WICHE)

ENDNOTES

1. For a more detailed discussion of enrollment management concepts see Appendix A.
2. For a detailed discussion of possible future changes see the Task Force Working Paper "Future Changes: Implications for Arizona Universities," July 1988.
3. The WICHE data for high school graduates and population estimates for Arizona were obtained from the Arizona Department of Economic Security.
4. The U.S. Bureau of Census estimate includes the changing migration rates and when viewed in the overall history and context of change in Arizona populations appears to be more a more realistic estimate.
5. The ASU West figure is not a projected value but a planning figure; the NAU estimates do not include NAU Yuma.
6. The model used by Plane incorporates interstate migration data for academic year 1978-79 and assumes the historic pattern of college-going remains constant. These models do not account for variables other than the stated interstate migration shifts and the WICHE determined high school graduates.
7. It is very important to recognize these assumptions were selected to provide a range of possible actions to develop several realistic forecasts for the year 2000 enrollment of the combined universities. Actual assumptions will vary by university and may be quite different than those listed here for purposes of discussion.
8. Source is NCHEMS fall 86 data of 3,500 institutions in the United States, public and private, 2-year and 4-year.
9. This is a very difficult concept to substantiate empirically. There is a general feeling among those contacted that you loose educational value when sizes get large, but it depends on the institutional location and purpose. There are also views to the contrary.
10. It is not clear how the recent increases in out-of-state admission standards will affect enrollment growth at Arizona's universities. Such increases are planned for two institutions for in-state students and provide "windows" for provisional admission for those not meeting the formal standards.
11. A recent controversy in California on the need and location of a new campus (for reasons similar to the Arizona case) has prompted the University of California Vice President William B. Baker to state "it's just not academically sound to have campuses of 40,000 to 50,000 students." Chronicle of Higher Education July 13, 1988, page A17.
12. The issue of "maximum enrollments" was raised in the 1974 ABOR document "University Development in the Mid-Seventies: A Long Range Plan," but concludes that

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the decision will be deferred until 1979. There has not been any formal discussion since the 1974 document was released.

13. The availability of ASU West as a receiver for many of these students is not clear given the current curriculum and the geographical location.

14. All FTE calculations in this section are stated under the old definition (lower and upper division treated equally). The current method treats upper division differently.

MANAGEMENT
EFFICIENCY AND ACCOUNTABILITY

THE GOVERNANCE AND DECISION MAKING PROCESSES OF THE ARIZONA BOARD OF REGENTS AND UNIVERSITIES

JACQUELINE SCHNEIDER AND EDWARD JOHNSON

INTRODUCTION

The Arizona Board of Regents is a body corporate charged with the governance of the three universities. The universities have no independent existence but rather are extensions of the Board. As such they are governed through implementation of policies and regulations adopted by the Board. With the approval of the Board, each university adopts internal rules and procedures that are consistent with its particular needs.

CONSTITUTIONAL AUTHORITY AND RESPONSIBILITY OF THE BOARD

Each of the fifty states have exercised their residual powers under the Constitution of the United States to establish public institutions of higher education. Twenty-seven states make explicit reference to higher education in their constitutions and the remainder have legislatively provided for such a system.

Arizona is one of only nine states with a constitutional provision for higher education which provides recognition of the state university. The other states are Michigan, Minnesota, California, Colorado, Georgia, Idaho, Oklahoma, and Nevada. A constitutionally created university system such as Arizona's is insulated to a substantially larger degree than statutorily created systems from both legislative and executive branch interference with its internal affairs. The system exists as an entity of state government with powers that clearly transcend those of other departments and agencies. The State Constitution of 1911 creates the Board of Regents to provide for the governance of the university system and directs the legislature to enact laws to provide for the establishment and maintenance of a university. It further provides that the general conduct and supervision of the public school system will be vested in such local governing boards as the law provides. This language has been construed by Arizona courts to vest control of the universities solely in the Board.

The state constitution also requires the Arizona legislature to appropriate such tax money "as shall ensure the proper maintenance of all state institutions," and

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Dr. Edward Johnson, higher education administrator and attorney, is a staff member of the Arizona Board of Regents. He previously served as Director of Law, Science and Technology Programs at Arizona State University. His other administrative positions have included institutional development programs at public and private institutions. He served as Assistant to the Director and Staff Counsel to the Task Force on Excellence, Efficiency and Competitiveness.

to "make such special appropriations as shall provide for their development and improvement."

STATUTORY AUTHORITY AND RESPONSIBILITY OF THE BOARD

Title 15 of the Arizona Revised Statutes establishes the statutory framework for the governing powers and responsibilities of the Board. It provides authority for the Board to maintain the state universities and vests it with the general corporate powers to contract; sue and be sued; purchase, receive and sell real and personal property; and hold leases of real and personal property and conduct such other business as may be consistent with its role as the governing body of the university system.

The statutes endow the Board with general administrative authority to enact ordinances for the governance of the institutions under its jurisdiction; to appoint, employ, and make salary recommendations of all officers and employees, and their removal; the fixing of tuition and fees; the establishment of curricula and courses; the awarding of degrees and diplomas; the prescription of admission qualifications for veterans; the adoption of energy conservation standards; the employment of attorneys; and the authority to settle litigation not covered by self-insurance.

Personnel-related authority permits the development of a comprehensive merit pay plan and the establishment of personnel policies. Authority relating to academic affairs includes the supervision of teacher training schools and the approval of courses of study and academic degrees.

The Board is empowered to establish alternative retirement programs; to manage the Arizona State Museum; to adopt rules prescribing procurement policies and procedures; and to enter into agreements with other governmental agencies. Financial authority is granted to maintain a "Universities' Fund;" to expend income of land funds; to expend money for the use and benefit of the institutions; to accept grants of money; and to issue bonds and manage money and property, including, specifically, research parks.

Additional state statutes authorize the Board to exercise authority related to lease the University Hospital; to operate a WICHE program; to adopt guidelines regarding tuition classification; and to exercise the power of eminent domain. The University of Arizona is designated as the land grant institution for the state and as such operates the Arizona Agricultural Experiment Station and the Arizona Cooperative Extension Service, both of which receive federal funding through the U.S. Department of Agriculture.

Arizona case law has further interpreted the specific powers of the Board. The Arizona Supreme Court has held that the Board has powers which are expressly delegated to it as well as powers which may be reasonably implied for the purpose of effectuating its mission. In a case dealing with the expenditure of funds, the court determined that the Board has been given complete control of the management of its offices and the universities, including expenditure of funds, with the caveat that the funds must be used for the purposes for which they are appropriated.

DELEGATION OF AUTHORITY BY THE BOARD

The Arizona legislature has given no authority directly to university administrative officers and has provided minimal guidance on the authority to delegate. In Arizona, state agencies and officers have no common law or inherent powers and thus, the authority of university administrators is derived from such powers as the Arizona Board of Regents delegates to them.

The role of the Board of Regents in the day-to-day management of the officers of the three universities must, of necessity, be limited to broad issues of policy determination, assignment of role, scope and function of each university, establishment of rules and regulations governing financial and personnel matters, appointment and evaluation of its chief officers and general review of the performance of the institutions on a periodic basis. Some aspects of institutional management have been specifically assigned to the Board itself by legislative action and hence may be delegated to either the executive director or the university presidents.

The power of the Arizona Board of Regents is viewed as a public trust conferred upon the Board by Constitution and statute for the benefit of the institutions over which it presides.The Board has discretionary as well as ministerial powers. The Board may only delegate a discretionary power when it establishes criteria that are suficient to transmute the discretionary function into a ministerial function. Any circumstance in which a board could choose freely between alternative courses of action given a specific set of facts is an exercise of the board's discretionary authority. Powers of the Board which require the exercise of discretion of judgment are exemplified by determination of contract terms, hiring and firing decisions, and the establishment of systemwide policies on a broad array of subjects as reflected in the Board's policy manual. Ministerial functions are generally defined as acts which require little or no discretion. Examples of "ministerial" functions include signing contracts or leases with specified terms or ascertaining the qualifications of applicants for employment. The Board may also delegate the function of determining facts, circumstances or contingencies upon which the exercise of its discretion depends. However, the Board itself makes the final decision where more than one course of action is available under the facts established.

THE ROLE OF BOARD COMMITTEES AND COUNCILS

Pursuant to its bylaws the Board has established three standing committees composed of members of the Board appointed by the President. The President and student regent serve as ex officio members of all standing committees.

The Resource Committee is charged with responsibilities related to operating, capital and local fund budgets; general finance and accounting; internal and external auditing; and registration fees and tuition. The committee also reviews and makes recommendations concerning organizations related to the Board, such as foundations and research parks.

The Committee is charged with responsibilities relating to capital budgeting review; capital development policies; and sales, acquisitions and leases of real property.

Among the additional responsibilities of Committee are the development and implementation of Board policies including a comprehensive Human Resources Plan, and responsibilities related to compensation and benefits issues, oversight of the Board and universities' Affirmative Action Plans and monitoring periodic institutional reviews of personnel management systems.

The Program Committtee of the Board has responsibilities related to academic degree programs, academic organizational units, and academic personnel policies in conjunction with the Resources Committee. The committee also oversees the implementation of Board policies related to student affairs and articulation.

The Program Committee is also charged with responsibilities relating to governmental relations, coordination of legislative relations, and general public affairs issues.

The Strategic Planning Committee is charged with the development of and the recommendation to the Board of a systemwide strategic plan including demographic and enrollment projections, University System and individual university missions, establishment of priorities, strategies for achieving excellence, and the development of goals for the system and each university.

EXECUTIVE STAFF COUNCILS

Over the years the Executive Directors of the Board have formed five Executive Staff Councils to assist the Board of Regents Central Staff in the review and analysis of university systems issues and the preparation of action items for Board committees and Board consideration.

The Council of Presidents, which includes the three university presidents and the executive director of the Board of Regents, addresses a full range of issues relating to the upcoming Board meetings and issues that are of mutual interest to the individual universities.

The Academic Affairs Council, which includes the academic vice presidents of the universities and appropriate Board staff, reviews all matters related to academic degree programs, academic organizational units, academic personnel policies, and general academic policies.

The Business Affairs Council includes the administrative and financial vice presidents of the universities and appropriate Board staff. It reviews all matters related to budgets, finance, business operations, capital construction, and classified personnel.

The Student Affairs Council includes the student affairs vice presidents of the universities and appropriate Board staff. It reviews issues such as student financial aid, the Code of Conduct, student health insurance, and other issues regarding student services.

The Legal Affairs Council consists of the universities' counsel and the Board counsel. It reviews all legal issues confronted by the system and proposed Board and institutional policies that have legal implications.

Councils usually meet one or two times per month and are chaired by a member of the central staff.

357

INTERNAL DECISION MAKING PROCESSES AT THE UNIVERSITY LEVEL

Universities are inherently complex organizations. Like other organizations they have goals, hierarchical systems and structures, officials who carry out specified duties, decision making processes that establish institutional policies, and employees who conduct the affairs of the university in instruction, research and service and handle routine support functions. The also exhibit certain distinguishing characteristics that affect their decision making processes, including the concept of collegiality, which has evolved from the historical conception of universities as "communities of scholars." This historical decision making model reflects the philosophy that decision making should not be like the hierarchical process in an bureaucracy. Instead there should be full participation of the academic community, especially the faculty. It also emphasizes the professional faculty member's ability to make his or her own decisions and his or her need for freedom from organizational restraint. Thus, the decision making process is highly participatory and widely consultative. Three components of the formal governance structure at each university--institutional, faculty and student--ensure that each of these major groups of the university community are consulted in decision making processes.

The president of each university is appointed by and serves at the pleasure of the Board. Each represents his or her institution in matters coming before the Board. By statute, the Board submits individual budgets for each of the universities and for the Board and its staff. The legislature appropriates funds to each of these entities through line items.

UNIVERSITY OF ARIZONA

The president of the university has four vice presidents who report directly to him: senior vice president for academic affairs and provost, the senior vice president for administration and finance; the vice president for university relations and development; and the vice president for planning and budgeting. There are also two additional vice presidents: the vice president for research (who is also dean of the graduate college) and the vice president for student affairs both of whom report to the provost. These six individuals along with the vice provost, vice provost for medical affairs, the legal counsel to the president, the associate to the president and the assistant to the president comprise the President's Council, the principal advisory body to the president. Appropriate sub-groups deal with the specific recommendations regarding human, fiscal and physical resources.

All deans report to the provost and are members of the Deans' Council. Ordinarily recommendations relating to academic matters move from departments, up to deans, to the provost, to the President's Council, and the president, although there are frequent dialogues among the different levels. Policy directions as well as specific decisions are often issued from the president's office down, after appropriate consultation.

The Faculty Senate is the official governing body of the faculty and serves in an advisory role to the president on academic matters. Its membership consists of forty-four elected faculty members and all vice presidents and deans who serve among the twenty-two ex officio voting members. There are also nine student members who are appointed by Associated Students of the University of Arizona. The president is voting member of the Faculty Senate. The elected members from the faculty serve two year terms and are elected either as representatives of the individuals colleges or at-large. Standing committees of the Senate include Academic Personnel Policy, Budget Policy, Instruction and Curriculum Policy, Research Policy and Student Affairs Policy. There are also several elected faculty committees which carry out specific responsibilities, including the Committee on Academic Freedom and Tenure, Committee on Committees, Committee on Conciliation, Committee on Elections and Committee on Faculty Membership.

The Associated Students of the University of Arizona is the official student governance body. Eight senators are elected at large each March to the student senate which acts on all monetary requests from nearly 300 registered clubs and organizations. The senators also advise the president and vice presidents on matters of policy, programs and general student concern.

ARIZONA STATE UNIVERSITY

The president of the university has six vice presidents who report directly to him: the vice president for academic affairs and provost, the vice president for student affairs, the vice president for business affairs, the vice president for university relations, the vice president for research, and the vice president and provost of the ASU West campus. These six individ-uals along with the four assistants to the president, the university general counsel and the director of intercollegiate athletics comprise the President's Council, the principal advisory body to the president.

All deans report to the vice president for academic affairs and are members of the Deans' Council. Ordinarily recommendations move from departments up to deans to the vice president for academic affairs and the president. The president relies heavily upon advice solicited from formal groups, from ad hoc study committees and from informal consultants within the university. Formal advisory groups include the Vice Presidents Council, the Budget Council, the Faculty Senate, Associated Students of ASU, and the President's Consultative Committee. Other groups that may be called upon through the appropriate vice presidents include, among others, the Dean's Council, the Graduate Council and the Staff Personnel Committee. When broad issues emerge on the campus, ad hoc study groups are frequently convened to review the issues and to make recommendations.

The Faculty Senate is the official governing body of the university faculty and advises the president on academic matters. Its membership consists of one hundred five elected faculty members. Senate officers, the president of the Associated Students of ASU, the vice president for academic affairs and the president serve as ex officio voting members. The elected members from the faculty serve three year terms and are elected as representatives of the individual colleges. There are several standing committees of the Faculty Senate including Academic Affairs, Academic Freedom and Tenure, Committee on Committees, Executive Committee, Faculty Personnel Committee, Financial Affairs and Physical

Plant, Student Policy and University Services.

The Associated Students at Arizona State University is the official student governance body. Twenty senators are elected yearly. The student government has a number of vice presidents in areas such as activities and campus affairs.

NORTHERN ARIZONA UNIVERSITY

The president of the university has three vice presidents who report directly to him: the senior vice president for administration and finance, the vice president for academic affairs and the vice president for student affairs. These three individuals along with the assistant to the president, the president's coordinator for university relations and development, and the assistant to the president for affirmative action constitute the President's Executive Council, the primary decision advisory group to the president.

All deans report to the academic vice president and are members of the university faculty which advises the president on academic matters. Its membership consists of thirty-five elected faculty members. The president, the vice president for academic affairs, a library representative, and a representative from the Associated Students of NAU are ex officio members of the body. Members of the faculty serve three year terms and are elected as representatives of individual colleges. There are eight standing committees of the Faculty Senate: Executive, Nominations, Elections, Academic Affairs, Professionalism, Student Policy, Long Range Planning and Bylaws.

The Associated Students of Northern Arizona University is the official student governance body. Nine officers are elected yearly including a president, vice president for administration and finance, vice president for student services, three council persons, liaison council person, a representative from the Association of Woman Students, and a representative from the Association of University Residence Halls. ASNAU leadership also participates actively in university planning and decision making through regular contact with university officials and representation on the university Faculty Senate and other policy advisory bodies.

ARIZONA STUDENTS ASSOCIATION

Eleven selected officers oversee the Arizona Students Association, an active student lobbying group representing each of the three state universities before the Arizona Board of Regents and the state legislature.

A REVIEW OF THE PURPOSE AND SCOPE STATEMENTS OF THE TASK FORCE ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS OF THE ARIZONA BOARD OF REGENTS

SEPTEMBER 24, 1987

COOPERS & LYBRAND
AUGENBLICK, VAN de WATER
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TABLE OF CONTENTS

PAGE

I. EXECUTIVE SUMMARY 1

II. BACKGROUND AND APPROACH 5

III. DISCUSSION OF ISSUES 7

1. The Future
2. Strategic Planning, Roles, and Missions
3. Educational Quality
4. Research
5. Access
6. Funding
7. Management Efficiency

IV. RECOMMENDED PURPOSE AND SCOPE STATEMENT 41

V. IMPLEMENTATION PLAN AND RECOMMENDED PROGRAM OF WORK 43

I. EXECUTIVE SUMMARY

The purpose of the Task Force on Excellence, Efficiency and Competitiveness is to develop and submit recommendations to the Arizona Board of Regents for promoting excellence, for improving efficiency, and for assuring competitiveness of the Arizona plublic universities, individually and as a system. This report is our review of the Purpose and Scope Statements of the Task Force. The review was performed very quickly, by its nature serving to raise questions rather than to answer them.

The body of this report contains three major sections: discussion of the major issues we identified during the study, a proposed revision of the Purpose and Scope Statement based on those issues, and a suggested implementation plan for carrying out the suggested Mission and Scope within the timeframe of the Task Force. Those issues, arrayed under the three parts of the charge to the Task Force, appear below.

COMPETITIVENESS

It appears to us that the definition of competitiveness which is most productive for the Task Force to concentrate on is what role university efforts should play in enhancing the regional and national competitive stature of the state.

Four major issues bear examination:

- the role of universities in producing an appropriately educated work force for an expanding economy,
- the role of universities in providing intellectual and technological leadership for the future,

- the role of universities in building cultural understanding and growth in a state which is rapidly becoming majority Hispanic, and

- the capacity of institutions to carry out their assigned missions in terms of financial and other necessary resources.

EXCELLENCE

Quality of Education at the undergraduate levels.

Two aspects of the quality issue bear examination:

- Are the students receiving the quality of instruction, research training, and services they deserve? Many of those we interviewed expressed concern, and instructional expenditures per student appear somewhat low across Arizona universities.

- Is the state producing an appropriately educated work force to meet the present and future demands of our expanding economy? Evidence of economic and demographic growth would lead one to expect more rapid enrollment increases than have been reported.

Access to university education for all who can appropriately benefit from it.

- Are the universities, community colleges, and secondary schools effectively playing their appropriate roles in educating an increasingly diverse population?

- Is an ethnically broad enough band of Arizonans participating in university education to provide leadership for the Arizona of the future?

Role of Research in the overall development of the state and its university system. High quality scholarly research is an important component of a university system. For Arizona, how heavy an emphasis should be placed upon:

- Research as a part of graduate education,
- Research efforts valued as an intellectual development,
- Research as a contributor to economic progress.
- Assurance of the quality and relevance of research efforts.
- Funding Sources for Research.

EFFICIENCY

Universities are inherently complex and decentralized; management efficiency must be judged within that context.

- How well are resources being managed, and where are there areas of potential improvement?
- What is getting in the way of efficient management?
  - statutes, regulations, procedures at State, Board of Regents, or University level

  - funding process

  - staffing and organizational problems

- What changes would create incentives for more efficient management?

- How can efficiency be coupled with sufficient flexibility so that over time innovation is encouraged to meet new challenges?

Underlying all of these questions is the issue of planning for a dramatically changing future. The Task Force has the opportunity to invest several months of careful review and deliberation and to understand how well the universities are now positioned to lead the state through this period of dynamic growth, and also to develop a clear vision of the changes that the universities will need to make in response to that growth.

II. BACKGROUND AND APPROACH

II. BACKGROUND AND APPROACH

As a part of Phase I of the Task Force's work, we were engaged to perform a preliminary environmental scan and comparative data review to identify the most important issues to be considered in reviewing and planning for the Arizona Universities. We were also asked to run a comparison, based upon Higher Education General Information Survey data, of each Arizona University against a set of other institutions.

The primary portion of the study was a series of intensive interviews. We talked with 105 Arizonans over a three week time period, including Task Force members, other Regents, members of the business, university, and political leadership of the State, and students and faculty members at each university. Because of the importance of the information being collected through interviews, we more than doubled the original scope of this section of the engagement, with concomitant decreases in the time invested in the analysis of other data. The report contains a synthesis of their perceptions of the strengths and weaknesses in the university system, as well as their thoughts about the future of Arizona and the Universities' capacity to contribute to economic, intellectual, and cultural development.

Our interview list was based upon recommendations from Task Force members. All have deep roots in Arizona, and all occupy key positions in the State. Most were educated at one of Arizona's universities. Except at the universities themselves, we did not talk with representatives of the large in-migrant population, nor did we meet with any "ordinary" citizens. In all, those whom we interviewed represent a special -- and therefore somewhat narrow -- sample of the state's population. This fact makes some of the findings, which emphasize the responsiveness of the universities to the needs of all citizens, even more dramatic.

In addition to the interviews, we examined the following:

- overall statistical data regarding the economy and demography of the state,
- information about recent trends in the institutions, and
- comparisons of each university on a wide range of publicly available variables to a range of other institutions.

We also requested that the Board and the universities compile data in a number of categories that we believe will be helpful to the Task Force as it proceeds further with its efforts.

The data we examined evidenced two substantial difficulties. First, largely because of the brevity of the effort, much of the Arizona demographic and university information is somewhat fragmentary. This difficulty can be overcome easily by the Task Force during the next and longer phase of its work. The second difficulty concerns the usefulness of the comparisons to other universities. Again because of time constraints, the comparative data was generated based on already-developed listings of institutions which include some whose relevance to the Arizona universities is difficult to establish. For both kinds of data, we have chosen to reflect findings in our issues discussions only in those cases where the implications seem clear and unclouded by such ambiguities. The full set of data with which we worked will be made available to the Task Force.

After consideration of the range of information we collected from the various sources, we have developed a clear sense of general public enthusiasm for the universities and a history of good State financial support for the institutions, but not for financial aid directed to the students. We have developed a list of major issues, with a number of subsidiary questions, that we believe should be made the central focus of Task Force efforts.

III. DISCUSSION OF ISSUES

III. DISCUSSION OF ISSUES

CRITICAL ISSUE #1 - THE FUTURE

WHAT ARE THE UNIVERSITIES AND THE BOARD OF REGENTS DOING TO ADDRESS THE CRITICAL CHALLENGES THEY WILL FACE IN THE NEXT TEN TO TWENTY YEARS?

BACKGROUND

To most Arizonans we interviewed, growth itself is the single most critical issue facing the state. Arizona is one of the most dynamic and rapidly growing states in the Union. Within the last ten years:

- Population has increased by 40 percent, to 3.2 million
- Employment has grown by 75 percent, to 1.3 million
- Total personal income has more than tripled, to $40 billion.

The state is expected to reach a population of between five and six million during the next twenty years, far ahead of the national rate. Most people expect that this growth, as well as economic growth, will continue to focus on metropolitan Phoenix and Tucson. As part of that growth, minorities (primarily Hispanics and native Americans) are expected to comprise a majority of the school age population of Arizona within twenty years.

Nearly all those interviewed felt that Arizona's three universities were at or near their optimal size today. Further, many felt the universities were not adequately addressing their role in coping with the challenges of Arizona's future.

In 1985, the Board of Regents began a long-range or strategic planning process by starting a work group to analyze the future needs of the state. While this work group completed its reports, subsequent work to develop a long-range plan was shelved as the Board's resources were redirected toward addressing legislative concerns about intrastate equity of funding.

QUESTIONS RELATED TO THE FUTURE

Listed below are the three general questions we judged most relevant in addressing the future challenges facing Arizona's Universities. Listed under each are a set of more specific explanatory questions.

(1) What are the most critical growth issues the system faces?

- How will Arizona meet the increasing demands for postsecondary education of a rapidly growing population, and especially a rapidly growing Hispanic population?
- What are the ramifications for the universities of the increasing concentrations of population in two metropolitan areas, and of the continuing growth of Maricopa County's share of Arizona's total population?
- How will the universities assure adequate minority leadership within the universities in twenty years?

(2) How well do the strategic planning and program development processes of the Board of Regents and the universities anticipate future issues and convert them into current priorities, plans, funding requests and programs?

- What time horizon is considered in current planning?

- Are needs forecast and issues identified in such a way as to feed the program development and resource allocation processes?

- To what extent are university research investment decisions oriented toward the future?

- What do the universities aspire to be by the turn of the century?

(3) What constraints within the current system affect its ability to respond to the effects of growth?

- How much can or should the three universities grow? ASU, for example, is already relatively large compared to its self-selected peer group.

- How well do present programs match likely needs for the future?

- Is a so-called "second tier" or four year colleges desirable in Arizona?

IMPLICATIONS FOR THE TASK FORCE

The very existence of the Task Force reflects widespread consensus that Arizona's universities should critically analyze their current capabilities in light of the future challenges they face. However, the Task Force has neither time, resources, nor authority to resolve most of the issues raised above. These issues lie within the purview of the Board of Regents or the Legislature.

The Task Force can make a significant contribution to Arizona's resolution of these issues in the following ways:

- Identify a series of the most significant future-related issues, along with an assessment of their relative importance and recommended priority.

- Develop specific recommendations as to *how* the Board or Legislature should address the larger issues outlined above.

- Answer a series of baseline issues appropriate to the scope of the Task Force. Included might be:

    - What are the *physical* limits to growth of each university?

    - What are the *academic* limits to growth of each university?

    - What timetable should the Board Strategic Planning Committee follow in returning to deliberation of its central mission?

    - What implications do the findings of the Future Needs of the State Work Group have for excellence, efficiency and competitiveness?

    - What factors should be the central focus for the strategic plan?

    - What are the universities doing to recruit and retain minority faculty, students, and administrators?

- With what steps and timetable can the missions of the universities, community college and K-12 system be integrated?

The Task Force should set in motion, by the completion of its study, a set of steps which will assist in the implementation of its recommendations.

CRITICAL ISSUE #2 - STRATEGIC PLANNING, ROLES, AND MISSIONS

HOW WELL DO THE CURRENT MISSIONS, RESPONSIBILITIES AND SCOPE OF PROGRAMS OF THE UNIVERSITITES AND THE BOARD OF REGENTS MEET THE NEEDS OF THE STATE?

> "The clear definition of each institution's mission and scope is the very cornerstone of any rational planning process in a university system. Well defined institutional mission and scope statements are vital for the provision of an effective and efficient system of higher education in the state of Arizona because 1) they insure economy by reducing the potential for unnecessary program duplication, and 2) they enhance the diversity of campuses and programs by identifying their unique characteristics and avoiding tendencies for universities to become more and more like one another." -- Arizona University System Mission and Scope Statement

BACKGROUND

The single most critical issue facing Arizona higher education, according to more than half the persons we interviewed, is the need for clarification and integration of the missions and scopes of the three universities and of the Board of Regents. The missions and scopes were thought to be too broad and vague. As a result, they appear to foster unhealthy competition within the system and do not represent what the universities currently are or are trying to become.

Most interviewees who were familiar with the contents of the universities' mission and scope statements criticized the statements as being overly open-ended, vague, and not representative of what the universities were actually trying to become. We were interested to note that a significant number of the faculty members with whom we spoke had never seen the mission and scope statements of their universities, much less participated in their development.

The mission and scope statements were also criticized for not promulgating a clear vision of the institutions' futures. The end result in the minds of many was that the universities were trying to fulfill too broad a role - becoming "all things to all people."

The mission statements are also widely perceived to be fostering competition rather than coordination and resulting in uneven allocation and application of resources. When we asked people about the "competitiveness" of Arizona's universities, a significant number immediately focused on the competition among the three universities rather than on competition with other states.

Many people felt that intra-state competition reduced system-wide strategic planning and funding process to a set of tradeoffs among the individual institutions, with decisions based more on politics than on either mission or the strengths of a given proposal.

A number of people concerned with the quality of baccalaureate education and educational access for minorities raised the issue of coordination of mission with Arizona's community colleges and the K-12 education system.

Many of those interviewed questioned whether the Board of Regents is involved in too detailed a level of management issues in the operations of the universities. University representatives reflected a concern that calls from the Board appear to be frequent and crisis-related, not systematic, predictable, and clearly related to general management and policy.

Accountability, both for the quality of education and for the use of resources, was also an issue. Many felt it was difficult to determine who was actually accountable for various conditions, and especially to whom the university presidents and the faculties are accountable.

QUESTIONS FOR ROLE, MISSION AND STRATEGIC PLANNING

We have divided the issues related to roles, mission, strategic planning and programs into the following.

(1) What strategic planning is used by the universities and the Board of Regents and how well is it integrated with the capital and operational budgeting, funding, financing and program approval processes?

- How do processess for approving proposed programs and reviewing existing programs take into account Arizona's current and predicted educational needs?
- Does strategic planning include time lines and costs in addition to the listing of objectives?

(2) How well do the existing mission and scope statements provide guidance for the planning and funding of university programs and initiatives?

- What mechanisms exist for planning and coordination of the missions and scopes of the Arizona universities, and are these mechanisms adequate?
- How well do current missions and programs align with Arizona's current and anticipated educational needs?

- How clearly do existing mission and scope statements treat what the universities will not do or aspire to do? How well do they translate into programs and funding?

- Are the goals and objectives of the individual universities well defined with respect to:

    - minority access
    - remedial education
    - economic development
    - community/public service
    - research, and
    - teaching?

(3) What kinds of processes exist for making program decisions and how well do they work?

- Is the program mix internally and externally consistent, coordinated, and appropriately non-duplicative?

- Should night and weekend programs be pursued more aggressively in any of the colleges or schools?

- What is being done to address admission demands when the universities reach their capacity? Should enrollment management be actively considered as an important growth and quality management tool?

- What should be the role of community colleges in meeting increased needs for baccalaureate capability?

- How cost effective are "2+2" programs? What is their potential role in meeting needs for increased baccalaureate capacity?

(4) Are the principal responsibilities, priorities, organizational structure, and activities of the Arizona Board of Regents and its Central Office Staff well defined and consistent with those of the Universities?

- What are the constitutional and statutory powers and responsibilities of the Board of Regents?

- What is the appropriate level of involvement of the Board of Regents in the management and operations of the universities?

- How effectively is the Board of Regents discharging its responsibilities for strategic planning, policy setting and performance monitoring?

(5) What kinds of accountability exist within the system, and how is performance measured?

- How accountable are the universities for accomplishing their missions, goals and objectives?

- Is there sufficient accountability in the system for proper planning, for appropriate use of resources, and for academic and administrative performance?

- How are expectations of university performance set, and to what degree is university performance measured against objectives and mission?

- What mechanisms are in place for the internal evaluation of academic and administrative achievement?

IMPLICATIONS FOR THE TASK FORCE

A number of persons we interviewed suggested that the Task Force on Excellence, Efficiency and Competitiveness should itself undertake an effort to revise and clarify the universities' mission and scope statements. Such an effort is clearly the Board of Regents' responsibility.

We believe that a more appropriate set of objectives would include reviewing the planning process and mission statements, establishing the agenda of issues and their relative priorities based upon the rest of the Task Force's efforts, and recommending a means to effectively implement the whole range the Task Force recommendations, including developing new mission and scope statements, if necessary. Otherwise, the Task Force runs the risk of finding its entire energy absorbed by this single effort.

CRITICAL ISSUE #3 - EDUCATIONAL QUALTIY

HOW CAN THE OVERALL QUALITY OF UNDERGRADUATE EDUCATION BE IMPROVED?

BACKGROUND

Educational quality is a very difficult characteristic to measure, and we received a wide variety of opinions on the quality of educational programs at the universities. There was a significant group who felt the quality should be raised, expressing concerns regarding the size versus quality of the universities; the qualifications, productivity, and accessibility of the faculty; and the increasing percent of faculty time devoted to research. Recognizing the difficulty of measuring academic quality, both the academic and lay people we interviewed voiced a strong desire to develop and use performance indicators to measure quality and productivity.

A number of people expressed concern both about the effects of university size on excellence and about their impression that quantity of programs and students may sometimes take precedence over quality of education.

The universities are providing three types of education; undergraduate, graduate, and professional. As is traditional in most states, the primary focus of public interest is on the adequacy of undergraduate programs.

There was general agreement on one point: the quality of the baccalaureate experience needed immediate attention and improvement. However, in all cases, those opinions were based upon anecdotal information or personal experience.

Apparent and underqualification of graduate teaching assistants, and the inaccessibility of regular faculty, were consistently voiced complaints.

The quality of graduate and professional education did not draw significant attention from those we interviewed outside academia. An additional focus of many concerns was on the apparent replacement of undergraduate teaching with research as the primary focus of faculty time. There was clear consensus among faculty and academic leadership, however, that training in research is a critical part of graduate (and some professional, i.e., medical) education.

The lack of productivity of some tenured faculty members was cited as a major source of inefficiency in the universities, and an obstacle to increased efficiency and quality.

QUESTIONS RELATING TO EDUCATIONAL QUALITY

(1) Are the universities delivering sufficient baccalaureate excellence at a price the state can afford to pay?

(2) How well does the educational environment in the universities support the delivery of a quality education?

- Do admission standards ensure that students admitted to the universities are prepared to do the work?

- Does the physical plant and equipment of the universities enhance or detract from educational quality?

- Are support services (e.g., libraries, student advisory services and counseling) enhancing or detracting from educational quality?

- Are classes the appropriate size?

(3) What are the key issues affecting the delivery of quality instruction?

- How well balanced are faculty workloads in teaching, research, and governance, and is this process monitored?
- How do the universities deal with the effectiveness of tenured faculty?
- How is the use of graduate teaching assistants managed? Are teaching assistants adequately qualified or taught to teach?
- Are senior faculty members available to baccalaureate students? Should they be?

(4) What incentives affect the quality of education, and what are their effects?

- What are the incentives for excellence in teaching, research and public service, and how do these incentives make people act?
- How is quality affected by the funding process and by the oversight of the Board?
- How are specific laws, rules, regulations, policies, procedures and general practices affecting the quality of education?

(5) What kinds of accountability for educational quality are in place and how effective are they?

- Who is accountable for the delivery of quality education?

- How are the universities and the Board of Regents measuring the attainment of academic and quality objectives?

- How are indicators of quality, productivity or other methods of performance used?

- Does student evaluation of courses carry weight in evaluation of faculty for promotion?

- Are there means for special recognition of particularly talented teachers?

- Is faculty teaching performance appropriately appraised, and against what standards or performance?

- Are education students receiving adequate preparation for the challenges of primary and secondary teaching?

- Are university graduates competing effectively for jobs at graduation?

IMPLICATIONS FOR THE TASK FORCE

Educational quality seems to be an area where the Task Force can play a valuable role by properly setting the agenda and direction. Because of the complexity and delicacy of the assessment of quality of education, the most common approach among universities has been the development of internal or peer reviews in which program offerings and quality of instruction of a set of schools or departments is reviewed each year. We suggest that the Task Force begin their work on this issue by commissioning a review of recent experience of other universities with quality assessment efforts. After this review the Task Force may have enough information to recommend establishment of new procedures in Arizona.

CRITICAL ISSUE #4 - RESEARCH

WHAT IS THE APPROPRIATE ROLE FOR RESEARCH EFFORTS AT ARIZONA UNIVERSITIES?

BACKGROUND

The key question asked by those we interviewed is the appropriate balance of state investment between research and instruction. While scholarly research is clearly an important part of the overall mission of a statewide university system, there are varied feelings on its effect on teaching and the benefit of the research to the State's economy.

As of 1983 UofA ranked number 22 among universities in research expenditure in the United States, and ASU ranked number 99. Among the top 50, UofA ranked sixth in level of state funding, and fourth in level of corporate funding. During the past few years we understand that federal sources have increased their share of the research enterprise, a development which should be encouraged.

ASU in 1983 ranked fourteenth among the "second fifty" in level of state support, and twenty-fifth in corporate support. Increases in the federal share of research funding is clearly also an important target for ASU as well.

Based upon a general lack of familiarity with university research, most of the non-academic people interviewed held either the strong belief or the strong suspicion that too much research and too little teaching are being carried out. Faculty members brought out a slightly different perspective, pointing out that while teaching is stated to be a priority at the larger two universities, the compensation and promotion of faculty were still tied more closely to their research or scholarly performance.

Many of the interviewees reported that the relationship between university research and economic development was not clear, but believe strongly that the universities are making a positive contribution to the State's economy.

QUESTIONS RELATED TO RESEARCH

(1) How appropriate are the current levels and sources of funding, and the allocation of human resources, to research activities of the universities?

- How much money is currently being invested in research, how is it being spent, and where does it come from?
- How much faculty, staff, and student time is devoted to research?
- Do the current incentives encourage wise allocation of research dollars and the development of high quality research programs?
- How much time and money should Arizona be spending on research, and how should those expenditures be targeted?

IMPLICATIONS FOR THE TASK FORCE

The Task Force should carefully choose its objectives in the area of research, as there is a real danger of exhausting its resources trying to find answers to questions of little ultimate impact.

Research is an essential component of the quality and competitiveness of the university system, and of the state. We believe it would be a time-consuming exercise to determine precisely the relationship between research and economic development; studies on such relationships invariably show a positive effect over the long term, and there is no reason to believe that Arizona's experience will be different.

We therefore would recommend a focus on examining the general level of investment in university research activities, the adequacy of procedures for assuring quality of research effort, and the potential for further enhancing the flow of non-State funds to the research enterprise of the universities.

CRITICAL ISSUE #5 - ACCESS

IS ARIZONA PROVIDING UNIVERSITY ACCESS TO ALL STUDENTS WHO CAN APPROPRIATELY BENEFIT FROM A UNIVERSITY EXPERIENCE?

BACKGROUND

The question of access to the universities was of broad concern to many people. The demographic projections prepared for the Board of Regents serve to underscore this as a significant, current issue which will grow materially over the next 10 to 20 years.

Access to a college or university education is of four different types - academic access, the ability to enter and succeed academically; financial access, the economic capability to afford to attend the institution; the social and cultural access to an environment or support system which helps students successfully adjust to and function in the university; and geographic access to programs while working or while living close to home.

Among people we interviewed, the establishment of successful programs for recruiting, educating, and graduating minority students was closely related to the concern over the undergraduate experience. It extended, however, to concern over providing adequate remedial education to those needing it, as is done now in several testing and developmental education programs.

Expectations are for the continued raising of academic standards as the institutions grow and become more crowded, thus heightening concern over the educating of minorities and raising additional questions about the role of the community colleges in this process.

Financial access was as important an issue as educational access. Tuition levels are relatively low compared to other states, primarily in response to requirements in the Arizona Constitution. Tuition provides a lower than average proportion of institutional revenues, and accounts for a relatively low proportion of educational expenditures.

The interviewees were not in agreement on the question of raising in-state tuition; they were largely unanimous in believing that increased financial aid must be tied to any rise in tuition, and also in general agreement that out-of-state tuition should be raised. Many people worried both that there seemed to be little financial aid available, other than tuition assistance, and that future tuition increases would worsen the situation. With varying rates for other charges (room, board and fees), the system appears to lack a consistent approach to pricing and a comprehensive approach to financial aid.

Rural Arizona does not seem well served with the universities concentrated in the major population centers. While the state has been divided into territories for each of the universities, many were concerned that the historical lack of programs and services provided showed the universities to be very interested in acquiring turf but not committed to serving it. The "Yuma experiment," however, is a demonstration of one attempt to take a four year program to a new area.

QUESTIONS RELATED TO ACCESS

(1) How effective are current programs in improving educational access of minorities to the universities?

- What is being done to improve the access of minorities to higher education in Arizona?

- Are minorities with first generation higher education experience well served at the large universities?

- Is there adequate coordination among the universities, community colleges, and their respective Boards with respect to program offerings and admission and articulation standards?

- How much remedial or developmental education are the universities providing, and is this too much or too little.

(2) How well is higher education being provided to those students who live outside the major metropolitan areas?

- What are the goals of higher education in rural Arizona?

- What are the universities doing to address the increasing demands for rural postsecondary opportunities?

(3) What is the effect of increasing admission standards on educational access of minorities?

- Is the state's approach to admission of out of state students (quantity, quality, and tuition) consistent with the mission and scope of the universities?

- Is the state's approach to admission of minorities consistent with the mission and scope of the universities?

- Should admissions standards be raised, lowered or maintained?

(4) What are the effects of Arizona's tuition policies and financial aid programs on financial access?

- Are tuition rates a barrier to the universities?

- How do tuition rates compare to other states?
- Is the state's approach to student financial aid a barrier or bridge to the universities?
- How might university costs be made more predictable and affordable for low income students?

IMPLICATIONS FOR THE TASK FORCE

Access to higher education has already received some degree of attention from the universities and the Board of Regents. In light of its continuing and growing importance in assuring a well-educated populace and a competitive economy, we suggest that access be considered one of the key factors in the planning and mission and scope deliberations discussed under Issues #1 and #2. To do this effectively it will be necessary to examine the demographics and issues in depth, and to develop an assessment of need and the degree of present success in providing access.

CRITICAL ISSUE #6 - FUNDING

DOES THE PROCESS OF FUNDING THE BOARD AND UNIVERSITIES ADEQUATELY REFLECT STATE PRIORITIES AND UNIVERSITY MISSIONS, AND ENCOURAGE THEIR ACHIEVEMENT?

BACKGROUND

There was no single issue which drew stronger or more polar opinions than the establishment of funding levels and the allocation of financial resources on an equitable basis.

The legislature has supported the universities either adequately or generously, depending on the source. Most agreed that the universities as a whole have not suffered from inadequate support.

Compared to a range of other states, Arizona State funds support a larger portion of all costs at the Arizona universities. There appear to be a number of possible reasons for this:

- Tuition is relatively low, and, unlike many states, Arizona does not provide for financial aid direct to students that would flow to the institutions as tuition,
- External research funds from federal sources are relatively low, so that state funds subsidize a larger portion of the research effort,
- Private fundraising from alumni and others, a revenue source increasingly used by state as well as private universities, has not yielded any significant amount of revenue in Arizona.

On the expenditure side, per student expenditures for instruction are relatively low at each Arizona university; value of equipment is also somewhat low. At ASU and NAU the portion of all expenditures spent on research is comparatively low, and at ASU and UofA operations and maintenance costs are low compared to the peers they selected. These phenomena may in part be explained by the dearth of resources other than state funds, because overall state support for Arizona's universities is relatively good.

There was also strong agreement from every quarter that the present funding process does not work well, and that the lack of a clear rationale for funding decisions (e.g. priorities, agreed-to plans and a clear allocation methodology) was damaging the ability of the universities to secure funding. However, there was little agreement on how to make the process work better.

There was universal desire for an equitable basis for state funding of the universities; however, the definition of equitable funding varied dramatically by university affiliation - (from a headcount basis with Arizona State University supporters; to a program, quality and mission basis with supporters of the University of Arizona; to a "2:2:1" rule of thumb used by some to support providing 20% of new funding to Northern Arizona University). The current incentives for incremental funding would seem to encourage growth, done at low cost.

It seemed clear to us that the universities have generally acted less like a system as they approached the budgeting and funding process and more like individual institutions, although the "legislative free-for-all" may have been better controlled by the Board in the most recent legislative session.

A number of those interviewed felt the budget process has tended to either "play heavy politics" or to "level the playing field", rather than deal with the appropriate needs and differences of the universities.

A number of interviewees expressed concern about the usefulness of the present budgets as submitted by the universities. Regents generally felt there was too little time to adequately review and modify the budgets. Others expressed the more basic skepticism about the realism of the budgets, observing that the universities "usually asked for more and got by with less."

The levels of faculty pay, often a topic of much contention in other states, drew little criticism, an observation at least partially supported by comparisons to faculty salary levels in other states. Salaries of administrative managers were questioned by some we interviewed.

Increased funding was felt, by many university officials, to be necessary for facilities, equipment, and to some degree for support services.

How to finance the expected growth in the system is also an important concern shared by those involved in funding and financing decisions.

QUESTIONS RELATED TO THE FUNDING PROCESS

(1) What effect have the present funding procedures had on the quality and efficiency of university activities?

(2) How effectively are appropriate program proposals and decisions integrated into the funding process?

- Is the state funding the right programs? Are the right allocations of resources being made between core programs and special programs?

- Does the approval process for new programs give adequate weight to the merits of the proposals? How well does the decision package process work? How is the effectiveness of new programs measured after approval and implementation?

- Do changes, particularly reductions, in programs put funding for individual universities at risk?

(3) How will future growth of the system be financed? What capacity does the present system have for such financing?

(4) How well does the budgeting process work in supporting system and university priorities and in providing a basis for funding deliberations?

- How well does the budgeting and funding process integrate with and support long-range planning?
- How useful are the current budgeting documents in supporting the legislative deliberations?

(5) How well does the current funding process work in the setting of levels of overall funding and in allocating those funds among the institutions and programs?

- Does the funding process drive or follow the mission and scope of Arizona universities?
- How does Arizona's overall level and mix of funding compare to other states?
- How does Arizona's funding for specific institutions compare to other comparable state systems?
- What implications do findings of the University Systems Budget Study contain with respect to efficiency and excellence?

- What is an "equitable" basis for the allocation of resources among programs and universities?

- What capacity does the state, and the Board of Regents, have to support future growth of the universities, and how will that growth be financed?

(6) What financial incentives exist in the system, and how do they cause people to act?

- What incentives or disincentives does the funding process provide for quality of instruction, efficiency of operations, and research, and how do these incentives make people act?

- Does the current method for establishing funding produce the desired results in the universities?

- Do the current incentives encourage the growth of programs of adequate quality?

- Does the concept of a continuation budget encourage or discourage management efficiency and excellence in academic programs?

- What effect does the funding process have on the way the universities and Board internally account for and control their financial resources?

- What would be an appropriate and effective set of funding incentives?

(7) Do the current tuition levels meet the state's goals?

- How much of the cost of education should out-of-state students bear?
- What should be the relationship between tuition policy and financial aid programs?
- Should the setting of tuition policy also include consideration of other student charges and fees?

IMPLICATIONS FOR THE TASK FORCE

The funding process is central to the implementation of university plans and initiatives as well as the direction of the educational enterprise. Because of the vast effect these decisions can have upon the decisions made by the Board and the universities, we believe this is a process deserving close review by the Task Force.

Questions to be considered should include:

- What incentives exist in the current funding methodology, and do they encourage desirable behavior?
- How has the funding of the universities affected the quality and efficiency of the universities individually?
- Have funding decisions supported or detracted from the needs and priorities of the state and the system as a whole?
- What should be the approach to setting tuition and other student charges, and how should that be integrated with financial aid programs?

- How can revenue from sources other than state general funds be increased?
- How can the funding process be improved?

CRITICAL ISSUE #7 - MANAGEMENT EFFICIENCY

CAN THE OPERATING EFFICIENCY OF THE UNIVERSITIES AND THE BOARD BE IMPROVED?

BACKGROUND

A general call for review of the efficiency of the management, organizational structure and operations of the universities and the Board of Regents was voiced by those interviewed. While there was broad agreement on the need, no consensus on the possible results emerged.

Many of those interviewed, including a number of Regents, felt that the universities are doing a good job of managing their resources. Others felt there is inherent difficulty managing any organization of this size, especially given the lack of recent, objective review. There was general agreement that it is crucial to the future credibility and funding of the system that the questions of "fat" and inefficiency be addressed and answered.

Of the few specific areas identified as targets of inquiry, the strongest concerns related to over-administration, or "too many layers of bureaucracy." The magnitude of the dollars invested in personnel would support this as a possible major area for investigation.

Other major consumers of resources, and generally fruitful areas of inquiry, are facilities and computing. Construction of new facilities has received significant emphasis by the Board over the past year. With the priority placed on facilities and equipment by the university presidents, this area will continue to deserve and receive emphasis, along with the utilization of facilities, operation and maintenance of the physical plant and effectiveness of energy conservation programs. Computing and telecommunications are undergoing a number of changes at the universities and are of such a size as to suggest review.

A number of business leaders and Regents expressed frustration with the slowness and inefficiency of the academic decision-making process, a common complaint in many states.

While we have included the review of tenure under the "quality" issue, tenure is raised by many non-academics as a cause of inefficiency in the universities. The comparison to other institutions showed the number of faculty to be largely comparable, although there was a decided lack of younger faculty, which might show either an aging of the faculty mix or a proportionately greater use of part-time faculty.

Finally, there was general agreement that there are few indicators of efficiency and performance and that the management information reported does not provide good evidence about performance. A focus on results, rather than the process, and much more significant use of performance and productivity indicators was felt to be necessary.

QUESTIONS ON MANAGEMENT EFFICIENCY

Specific issues related to operational efficiency are listed below:

(1) How efficiently do the universities and the Central Staff manage their resources?

- What are the primary management priorities and processes in the Board of Regents and the Universities?

- Are administrative organizations of the universities and the Central Office appropriately structured to deliver cost-efficient service?

- What are the facilities utilization rates for the universities?

- Is deferred maintenance kept at acceptable levels, and are the structures safe for users?

- How effectively do the universities plan, coordinate and implement telecommunications and academic, research and administrative computing?

- How well managed are the physical resources - physical plant, utilities, motor pool, etc.?

- Are there opportunities for adjusting staff appointments to better match academic year work loads (eg.10 month appointments)?

(2) What are the incentives and disincentives to efficient management of resources, and how do these make people act?

(3) How are specific laws, rules, regulations, policies, procedures and general practices affecting the efficiency of operations or the management of resources, including:

- Human resources, both faculty and non-faculty.

- Information resources, including financial, management, operational and academic information.

- Financial resources (cash, endowments, etc.)

- Facilities, physical plant and equipment.

- Land

- Entrepreneurship and work with and for corporations

(4) Is the financial and performance information reported adequate for monitoring the system and making decisions?

- Does financial information used to manage the universities and report to the Board of Regents provide an adequate basis for assessing the effectiveness of financial management?

- How is performance of the universities measured? What indicators of productivity and management effectiveness are used?

- Are decision makers getting the management information they need to plan, allocate and control resource utilization?

IMPLICATIONS OF MANAGEMENT EFFICIENCY ISSUES

The need in the area of management of resources is to determine both how effectively and efficiently each university and the Board are managing their resources and make recommendations for improvement, based upon the specific opportunity areas identified.

This assessment is far too detailed and time consuming for the Task Force to take on, and should be assigned to a group that would analyze each of the universities as well as the Board of

Regents and its staff. The assessment will be more effective if it is organized to measure each entity against its own objectives and responsibilities, thus minimizing the direct comparison of what are quite different organizations.

IV. RECOMMENDED PURPOSE AND SCOPE STATEMENT

RECOMMENDED PURPOSE AND SCOPE STATEMENT

TASK FORCE ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS

ARIZONA BOARD OF REGENTS

The purpose of the Task Force on Excellence, Efficiency and Competitiveness is to develop and submit recommendations to the Arizona Board of Regents for promoting excellence, for improving efficiency, and for assuring competitiveness of Arizona's universities, individually and as a system. Recommendations are to be based upon thorough surveys of the operation of the universities and university system, an analysis of the present and projected characteristics and needs of the State, broad-based public comments and suggestions, and a review of normative data describing comparable universities and university systems in other states. The primary goal of each area of examination shall be to assess the results of the study upon the excellence, efficiency and competitiveness of each institution and the system as whole. The work of the Task Force should include, but not be limited to:

- A review of statutory, regulatory, and procedural requirements within which the universities function.
- A review of State funding policies and procedures, the range of revenue sources available to the universities, and the overall levels of financial support for university missions.
- An independent management audit of the business operations of the universities and the Board of Regents' Central Office.

- A review of policies related to access to the universities including admissions standards, remedial programs, financial and support services, and articulation with community colleges and school systems.

- An evaluation of the nature and quality of undergraduate education being provided by the universities and recommendations for ongoing measurement and evaluation of effectiveness.

- An evaluation of the role of research and scholarly activity in the universities, including levels and sources of support, relation to instruction, and impact on the State's economy.

- An environmental scan of probable demographic, social and economic developments in Arizona over the next twenty years, and the implications of these developments for post-secondary education.

- An assessment of current strategic planning processes within each university and the university system.

- An evaluation of financial and other resources which determine the capabilities of the universities, individually and collectively, to carry out their fundamental missions of teaching, research and scholarship and public service.

V. IMPLEMENTATION PLAN AND RECOMMENDED PROGRAM OF WORK

IMPLEMENTATION PLAN AND RECOMMENDED PROGRAM OF WORK

The Scope and Purpose Document in the preceding section suggests a specific Program of Work for the Task Force.

The constraints influencing the Task Force's ability to accomplish any Program of Work are as follows:

- The Task Force is charged with completing its work by July, 1988.
- Because the Arizona legislature convenes in January, 1988, a premium should be placed on completing those activities which have significant legislative implications -- i.e., the management audit, regulatory and legislative analysis, and analysis of the funding process.
- Task Force members are unpaid volunteers whose time is scarce and valuable. Task Force meetings must therefore be extremely well programmed. It is crucial that meetings of the Task Force be focused on arriving at answers to hard questions and developing actionable recommendations to the Board.

The Task Force has employed an Executive Director, who will manage the efforts of four executives loaned from the universities and the Central Office staff.

The implementation schedule on the following page presents a suggested timetable for completing this program of work. Task Force and its staff will also need to identify specific task responsibilities, meeting and document delivery dates, and task interrelationships.

TASK FORCE ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS
RECOMMENDED PROGRAM OF WORK

TASKS AND WORK PRODUCTS	1987						1988					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Finalize Purpose and Scope	■											
Complete Staffing and Task Force Organization	■											
Management Audit		■	■	■	■	■						
Analysis of Funding Policies and Procedures		■	■	■	■	■						
Research Investment Review		■	■	■	■	■						
Future Scan		■	■	■	■	■						
Statutory/Regulatory Impact Analysis		■	■	■	■	■						
Submit Interim Report to Board of Regents							▨					
Quality Measures Review				■	■	■	■	■	■	■		
Access Review				■	■	■	■	■	■	■		
Planning Process Review				■	■	■	■	■	■	■		
Development of Alternative Future Models for University System										■	■	
Develop Overall Recommendatoins to the Board of Regents										■	■	
Final Report												▨

LIST OF INTERVIEWS

The Honorable Lela Alston, Arizona State Senate

Prof. Ronald Alvarado, Zoology, Arizona State University

Prof. Anne Atwater, Exercise in Sports Science, University of Arizona

Mrs. Edith Auslander, Member, Arizona Board of Regents

Mr. Jim Babbitt, Babbitt Bros. Trading Company, Flagstaff

Dr. Allan Beigel, VP for University Relations, University of Arizona

Dr. Frank Besnette, VP for Administration and Finance, Northern Arizona University

Prof. Matthew Betz, Civil Engineering, Arizona State University

Mrs. C. Diane Bishop, Superintendent of Public Instruction

Mr. Fred Boice, Boice-Roberts Company, Tucson

Ms. Pattie Bratcher, Arizona Student Association

Ms. Molly Broad, Executive Director, Arizona Board of Regents

Prof. Gary Buckley, Political Science, Northern Arizona University

Mr. Ed Butterbaugh, Ernst & Whinney, Tucson

Ms. Esther Capin, Arizona Board of Regents

Mr. Reuben Carranca, Associated Students of the University of Arizona

Prof. James Carroll, Educational Psychology, Arizona State University

Prof. N. Joseph Cayer, Public Affairs, Arizona State University

Mr. Herman Chanen, Arizona Board of Regents

Mr. David Chase, Vector Corporation, Flagstaff

Mr. Platt Cline, Flagstaff

Mr. Lanny Kope, Associated General Contractors of Arizona, Phoenix

Mr. George Cunningham, Jr., VP for Administrative Services, University of Arizona

Mr. Mick Dalrymple, Arizona Student Association

Mr. Will Daly, Associated Students of Arizona State University

Mr. Dwight Daniels, Student, Northern Arizona University

Mr. Jack Davis, United Bank of Arizona, Tucson

Mr. Jack DeBolske, Arizona League of Cities & Towns, Phoenix

The Honorable William DeLong, Arizona State Senate

Dr. Alfredo de los Santos, Jr., Maricopa Community College District

Ms. Karen Donohue, Student, Northern Arizona University

Mr. John Driggs, Western Savings & Loan Association, Phoenix

Ms. Katie Dusenbury, City Van & Storage, Tucson

Mr. Karl Eller, Circle K Corporation, Phoenix

Mr. Tommy Espinoza, Espinoza Development Corporation, Phoenix

Mr. Ted Ferris, Joint Legislative Budget Committee

Prof. Bob Feugate, Engineering, Northern Arizona University

Mr. William A. Franke, Former Chairman & CEO, SW Forest Products, Phoenix

The Honorable Jim Green, Arizona House of Representatives

Prof. Eric Guilbeau, Chemical and Bio Engineering, Arizona State University

The Honorable Jaime Guttierez, Arizona State Senate

The Honorable Art Hamilton, Arizona House of Representatives

Dr. Nils Hasselmo, VP for Academic Affairs & Provost, University of Arizona

The Honorable Larry Hawke, Arizona House of Representatives

Mr. Max Hawkins, Arizona State Department of Administration

The Honorable Beverly Hermon, Arizona House of Representatives

Dr. Eugene Hughes, President, Northern Arizona University

The Honorable Jane Hull, Arizona House of Representatives

Mr. Michael Jackson, Student, Northern Arizona University

Mr. William Jacquin, Issue Management Incorporated, Phoenix

Mr. Leonard Judd, Phelps Dodge Corporation, Phoenix

Prof. Herbert Kaufman, Economics, Arizona State University

The Honorable Peter Kay, Arizona State Senate

Dr. Jack Kinsinger, VP for Academic Affairs, Arizona State University

Ms. Karin Kizer, Arizona Student Association

Dr. Henry Koffler, President, University of Arizona

The Honorable Carl Kunasek, Arizona State Senate

Ms. Karen Kunasek, Associated Students of Arizona State University

The Honorable Joe Lane, Arizona House of Representatives

Assoc. Prof. Dennis Larson, Agriculture Engineering, University of Arizona

Mr. John Lee, Joint Legislative Budget Committee

Mr. James Lincicombe, Motorola, Inc., Phoenix

Ms. Pat Loven, Flagstaff

Mr. Richard Mallery, Snell and Wilmer, Phoenix

Mr. Howard McCrady, Valley National Bank, Phoenix

Ms. Felicia McGinty, Student, Northern Arizona University

The Honorable Evan Mecham, Governor, State of Arizona

Assoc. Prof. Margaret Morley, History, Northern Arizona University

Mr. Joseph Mikitish, Arizona Board of Regents

Ms. Gaye Murphy, Executive Budget Office

Mr. Pat Murphy, Phoenix Newspapers, Inc., Phoenix

Mr. John Murphy, Flinn Foundation, Phoenix

Dr. J. Russell Nelson, President, Arizona State University

Mr. William Nelson, IBM, Tucson

Mr. Donald Olson, Department of Administration

Prof. Samuel Paplanus, MD, Pathology, University of Arizona

Prof. Daniel Peterson, Special Education, Northern Arizona University

Mr. A. J. Pfister, Arizona Boad of Regents

Mr. Donald Pitt, Arizona Board of Regents

Ms. Barbara Polk, Prescott

Mr. Eugene Polk, Prescott

Prof. Sharon Porter, Speech Communication, Northern Arizona University

The Honorable James Ratliff, Arizona House of Representatives

Dr. Patsy Reed, VP for Academic Affairs, Northern Arizona University

Dr. Henry Reeves, VP for Research, Arizona State University

Prof. Thomas Rehm, Chemical Engineering, University of Arizona

Prof. Elizabeth Roemer, Astronomy, University of Arizona

Mr. Roberto Ruiz, Ruiz Engineering Company, Tucson

Mr. Donald Shropshire, Arizona Board of Regents

Mr. John Schaeffer, Research Corporation of America, Tucson

Mr. James Simmons, United Bank of Arizona, Phoenix

Mr. Joe Smith, Executive Budget Office

Mr. Solly Sollenburger, Sechler-Sollenburger Realty Investment Company, Phoenix

Mr. Donald Solweidel, Yuma

The Honorable Jacque Steiner, Arizona State Senate

Mr. Tio Tachias, Arizona Board of Regents

Mr. John Teets, Greyhound Corporation, Phoenix

Mr. Philip Thompson, Museum of Northern Arizona, Flagstaff

The Honorable Doug Todd, Arizona State Senate

Dr. Ben Tuchi, VP for Finance and Administration, University of Arizona

Mr. Keith Turley, Arizona Public Service Company, Phoenix

The Honorable Robert Usdane, Arizona State Senate

Mr. John Vezina, Student, Arizona State University

Ms. Carolyn Warner, Phoenix

Mr. Alton Washington, City of Phoenix, Phoenix

Mr. Ralph Watkins, Arizona Board of Regents

Dr. Dudley Woodard, VP for Student Affairs, University of Arizona

Prof. Susan Wyckoff, Physics, Arizona State University

Mr. Victor Zafra, VP for Business Affairs, Arizona State University

A REVIEW OF THE ORGANIZATION, FUNDING PROCESS AND SELECTED ADMINISTRATIVE SYSTEMS OF THE ARIZONA UNIVERSITIES AND THE ARIZONA BOARD OF REGENTS

A REPORT TO THE REGENTS' TASK FORCE
ON EXCELLENCE, EFFICIENCY AND COMPETITIVENESS

MAY, 1988

Coopers
&Lybrand

EXECUTIVE DIRECTOR'S NOTE:

The Task Force at one of its early meetings reached the decision to use a nationally recognized management firm to conduct a review of the management efficiency of the three universities and the Board Office and of the funding and allocation system for the state universities. a Request for proposal for the conduct of the study was prepared by the Task Force staff and approved by the Task Force for release.

The request for proposal requested separate bids for an analysis of non-academic support services of the three universities and for a review of the procedures for funding and budgeting used by the universities, the Board, the Executive Department of state government and the Legislature. A sum of $300,000 was allocated by the Task Force. Four finalists were selected to make a formal presentation to the entire Task Force. The firm of Coopers & Lybrand was selected to conduct the study and contract was awarded in October, 1987.

During the following six months the survey was conducted, data collected and analyzed and tentative conclusions and recommendations reached. A preliminary report was critiqued by the Task Force staff, administrators from the universities and the Board Staff, and external consultants. The final document, however, represents the professional judgment of the contractor.

The Executive Summary of the final report of the study by Coopers & Lybrand is reproduced and follows this introduction. The complete report is available in the Board Office, 3030 North Central Avenue, Suite 1400, Phoenix, Arizona 85012. Copies have also been deposited in the University libraries of Arizona State University in Tempe, Northern Arizona University in Flagstaff, and the University of Arizona in Tucson.

A. EXECUTIVE SUMMARY

The Arizona Board of Regents established the Task Force on Excellence, Efficiency and Competitiveness in March, 1987 to address several critical issues facing the Arizona university system and to develop and submit recommendations for improving the system's excellence, efficiency and competitiveness.

The Task Force engaged Coopers & Lybrand to evaluate the management efficiency of the Arizona universities and Board of Regents, and to evaluate the state's process for funding this system of university education.

An executive summary of our final report on this project is presented in the following pages.

1191

1. SYNOPSIS

This report contains many different messages for many different stakeholders in the Arizona university system. The most important messages are these:

- Arizona's public university system is grounded on the enviable competitive strengths of institutional autonomy, popular support, a single well-empowered governing board, and increasing national recognition.

  Every effort should be made to nurture and protect these strengths.

- Arizona's ability to exploit these strengths is being hindered by five fundamental problems:

  - The lack of an articulated statewide strategy for higher education,
  - A cumbersome system-level decision-making process,
  - A funding process without a strategic "anchor",
  - Inadequate performance accountability, and
  - Inadequate information to support policy analysis, decision-making, and planning.

  Every effort should be made to overcome these weaknesses.

- While we found many opportunities for improvement in the specific administrative functions we reviewed, we found no "buckets of fat", and no systemic or widespread inefficiency.

1192

- In fact, we found dedicated, highly capable and energetic managers, executives, Board members and volunteers who were devoting enormous amounts of time, energy and talent in efforts to solve the day to day problems and issues facing these complex institutions. Many were engaged in "catch up" efforts to replace or streamline old systems, procedures and ways of doing business which the universities and the system outgrew long ago and which are badly in need of replacement.

Our summary recommendations are these:

- Undertake improvements in Board level organization and decision-making processes,
- Develop an effective strategic plan for Arizona's system of higher education,
- Reevaluate and modify the state funding process after the development of a strategic plan,
- Improve state-level information management capabilities and accountability reporting, and
- Undertake a number of specific suggested projects to reduce costs, increase value, reduce risk, and promote strategic goals.

* * * * *

The following pages summarize the detailed assessments and recommendations contained in our final report.

2. OBJECTIVES AND APPROACH

Our review focused on three major areas:

- Board level issues, including organization and decision-making, strategic planning, and Board information,
- The funding and appropriations process, and
- Selected administrative functions at the three universities, including information systems, human resources, physical resources and facilities, and procurement.

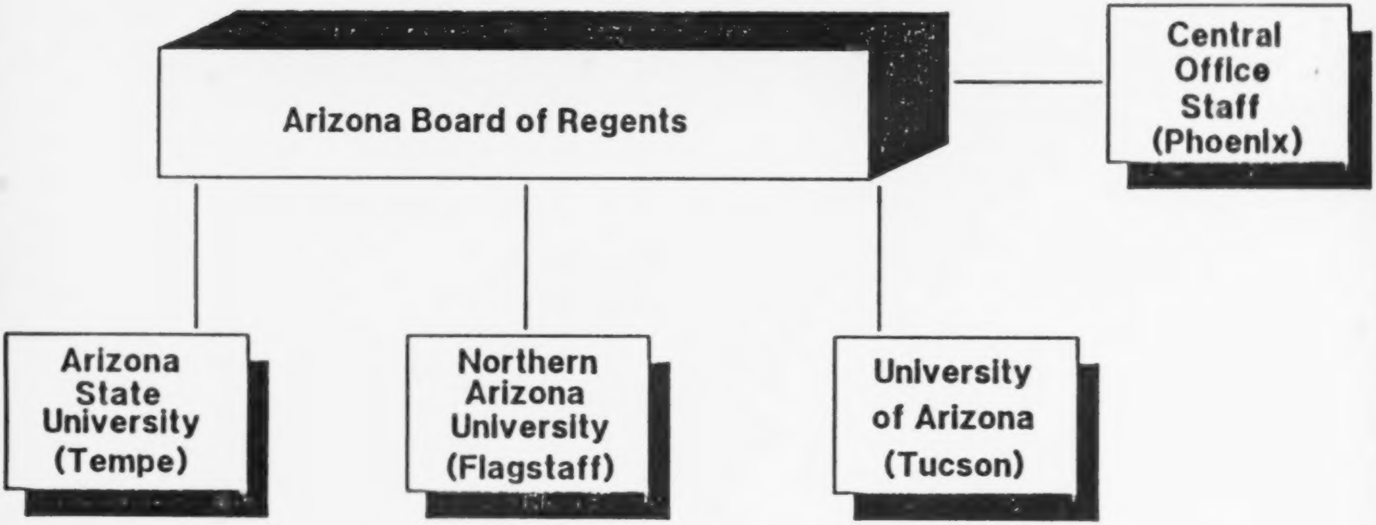
Our analysis was supported by data from focus group sessions, individual interviews, a user survey, site visits, selected interstate and intrastate financial and statistical analysis, and a comparative review of funding processes in other selected states.

Our review was limited to addressing a set of "high payback" areas identified during the first two weeks of the project, and therefore did not encompass all the business operations of the universities nor all areas within the business operations under review.

The review did not address academic issues such as faculty compensation or academic computing.

It is important to note that other objectives of the Task Force are being addressed concurrently and have not yet been integrated with this study. Potential areas of disagreement or redundancy may therefore exist between this study and other work being conducted by the Task Force and its staff.

Organization of the Arizona University System



Arizona Board of Regents

Central Office Staff (Phoenix)

Arizona State University (Tempe)

Northern Arizona University (Flagstaff)

University of Arizona (Tucson)

3. OVERVIEW

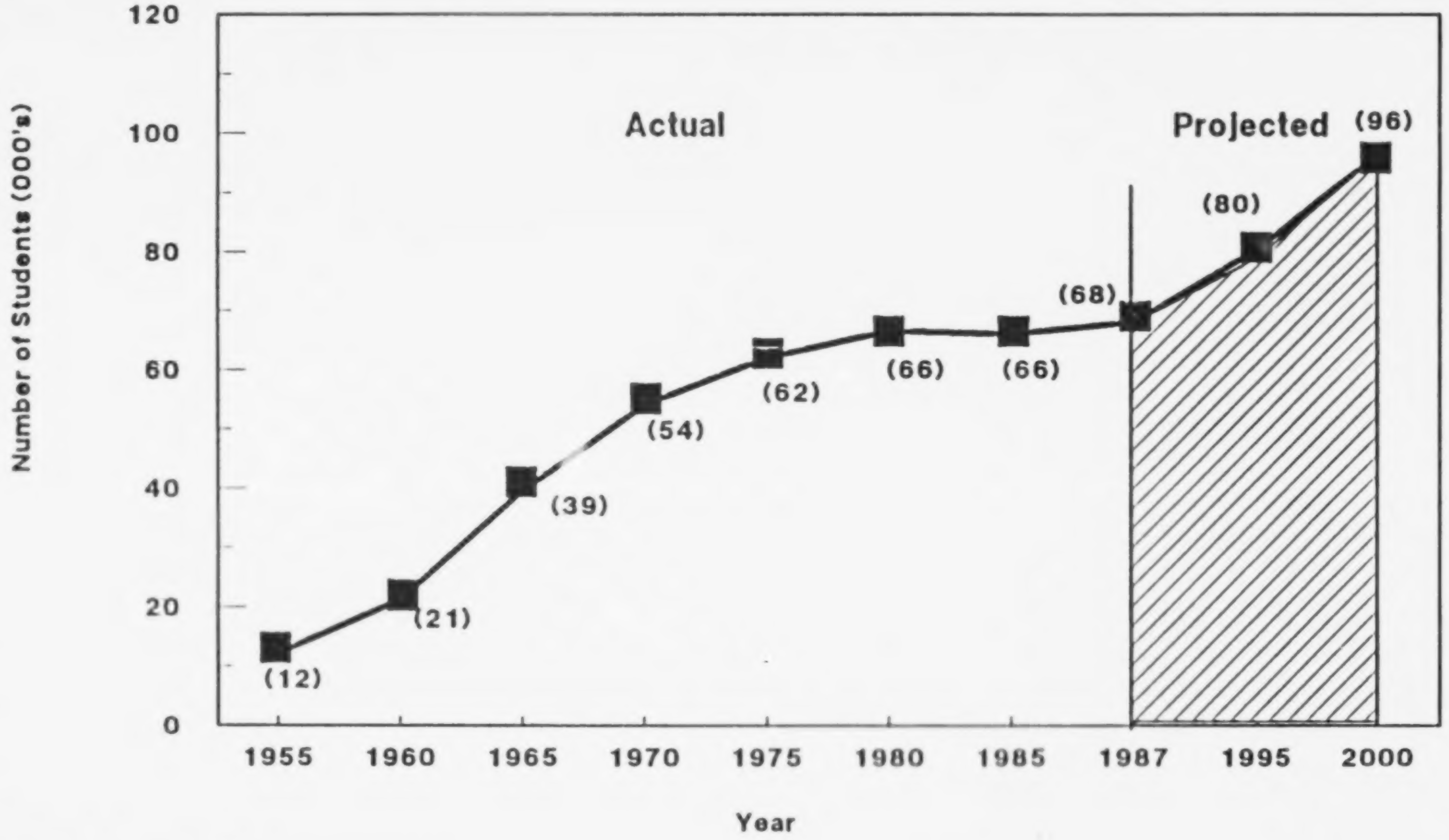
The Arizona university system is one of the state's three or four largest businesses.

- Over half of the system's billion dollar a year revenues are generated from local funds and sponsored research, with state appropriations of $454 million making up the balance.
- With almost 17,000 employees, the Arizona Board of Regents is Arizona's third largest employer, with an annual payroll of almost $500 million.
- The campuses, including ASU West, are located on almost 2,000 acres of land and consist of over 800 buildings and over 17 million square feet of classroom, office, laboratory and library space. Maintenance of this physical plant alone is a $60 million dollar a year operation.
- The universities procure over $220 million of goods and services in support of academic, administrative and research activities, and spend at least $27 million a year just to operate and maintain the system's computers.

Change is a principal driving force behind many of the problems we encountered, and is forcing fundamental shifts in the way the universities run their business.

- Unprecedented growth in student enrollments during the 60's caused the Arizona universities to more than double in size. Although the growth rate slowed in the 70's, with slight declines in the late 70's and early 80's, student enrollments nonetheless have increased more than ten percent in the past twelve years.

Student FTE Enrollment in the Arizona Universities



Source: Arizona University System 1987 Fact Book

- Projected demographic changes will pose many new challenges. The population of Arizona is projected to increase 66% to over five million people over the next fifteen years. Minorities are expected to comprise the majority of this growth and the majority of the school age population within the next 15 years.

- As a result of the demographic shift, improving educational access to minorities will become increasingly important in the future because these groups have typically had lower than average participation rates in higher education. Means for providing educational access to rural Arizona will also become increasingly important in reaching the state's growing minority population.

- Projections of continued growth in university enrollments also pose major challenges. Although many feel the Arizona universities are currently at (or quite possibly beyond) their optimum campus size for efficiency and educational quality, enrollments are expected to continue to increase to 96,500 students by the year 2000, a 46% increase from current levels.

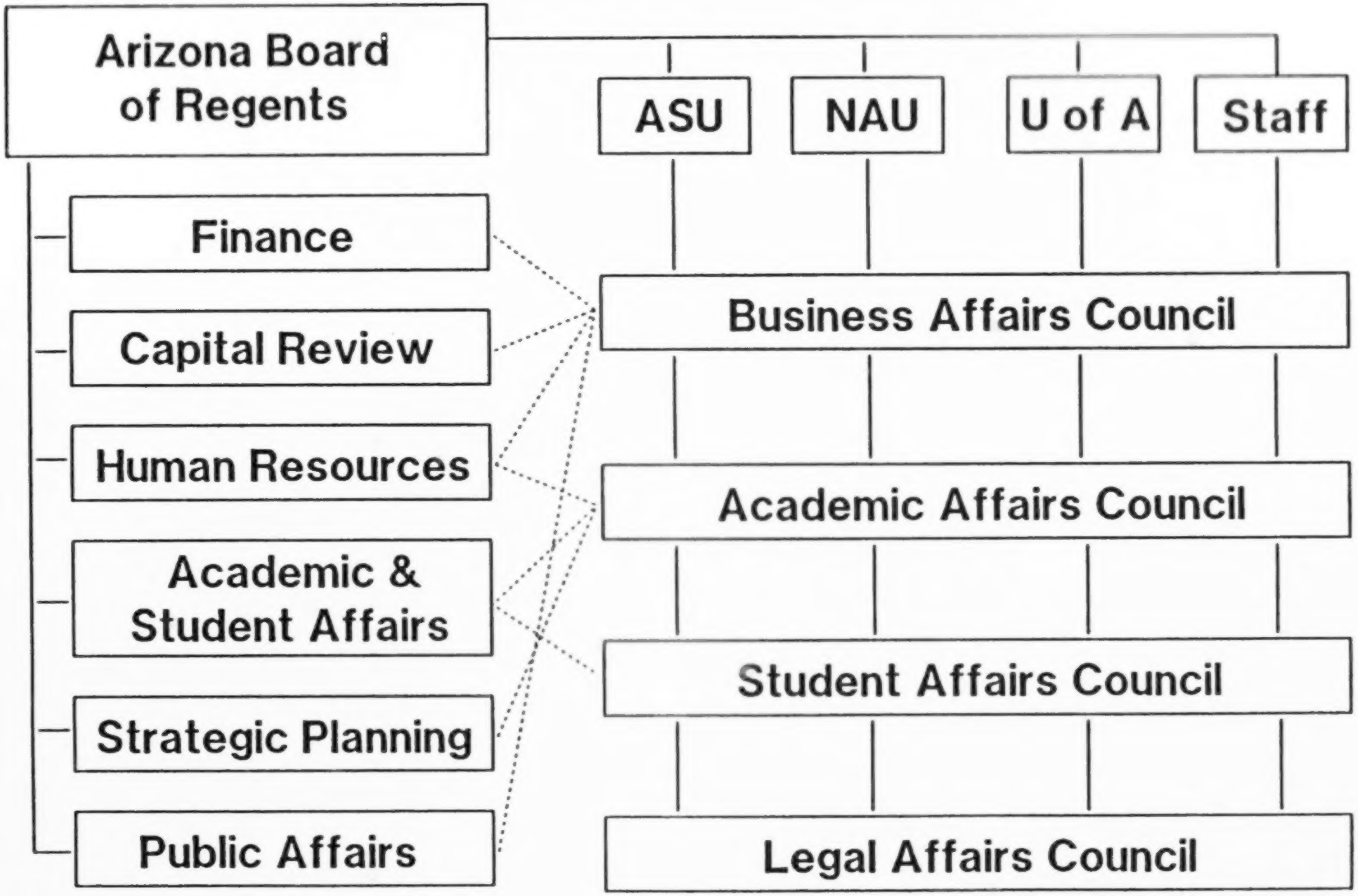
- Financial strains on Arizona state government are likely to lead to increased competition for funds. A combination of revenue shortfalls and increasing "formula driven" expenditures are placing strains on state finance which are likely to continue. Elected officials coping with such challenges will be increasingly interested in a demonstrable return on investment from all state funded programs.

- Increasing national and international economic competition combined with the pace of technological change and the costs of "big science" will require stronger and more formal partnerships or consortia among the universities, all levels of government, and the private sector.

In summary, Arizona's century of investment in higher education has resulted in a big, complex and growing university system. This system, comprised of an activist Board governing three strong and highly competitive universities is receiving increasing national recognition for the excellence of its instructional, research and public service programs. However, many major challenges face this organization--challenges which will require difficult choices, hard decisions, quick reactions and concerted hard work by its stakeholders.

These challenges represent strategic opportunities. If the Arizona university system is to seize them, it will need a clear vision, team spirit and strong, efficient mechanisms for doing the work.

DECISION MAKING STRUCTURE



Arizona Board of Regents

ASU

NAU

U of A

Staff

Finance

Capital Review

Human Resources

Academic & Student Affairs

Strategic Planning

Public Affairs

Business Affairs Council

Academic Affairs Council

Student Affairs Council

Legal Affairs Council

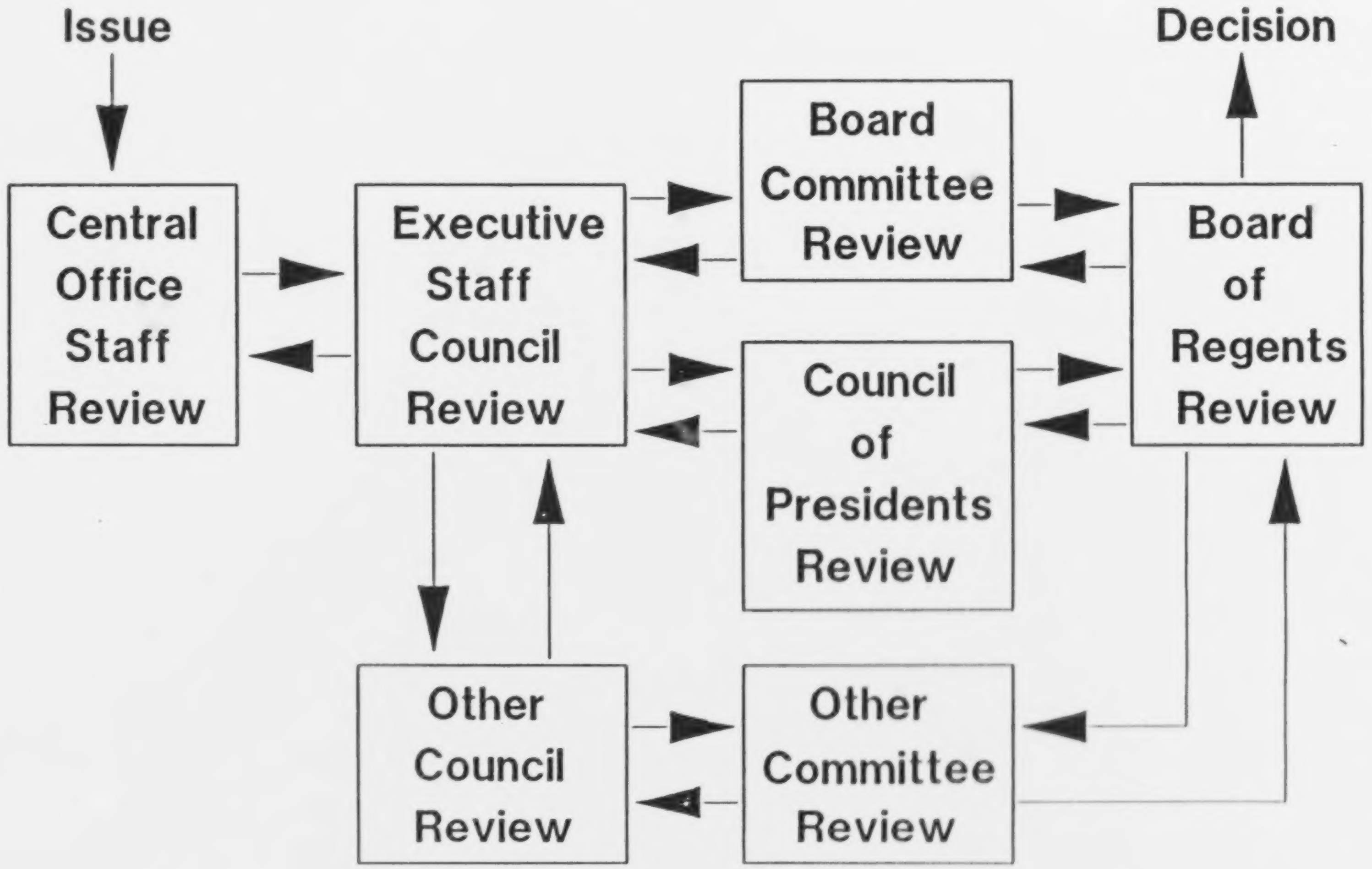
4. ASSESSMENT OF SYSTEM LEVEL ORGANIZATION AND DECISION-MAKING

Symptoms of organizational problems led us to analyze the organization and decision-making structures of the Arizona university system as a whole.

While we did not analyze organizational structures within the individual universities themselves, we did find symptoms of organizational stress at the Board level and between the Board office and the universities. Examples include the following:

- Organizational conflict and mistrust among various organizational entities was pervasive.
- Intra-state competition among the universities appeared to be excessive and to take precedence over a nationally or internationally competitive orientation.
- Decisions were being made at inappropriately high and low organizational levels.
- Many important activities were being undertaken in a reactive, short-term or "hurry up" mode.
- The Board was experiencing difficulty in implementing top-down decisions.
- Excessive Board and executive time was being devoted to meetings.
- Important policy decisions were being made with inadequate information to support the decision.
- Information bottlenecks were hindering the free flow of information.
- Significant efforts were being devoted to burdensome ad hoc data collection and compilation.

BOARD DECISION MAKING PROCESS



Issue

Central Office Staff Review

Executive Staff Council Review

Board Committee Review

Council of Presidents Review

Board of Regents Review

Decision

Other Council Review

Other Committee Review

A principal cause of these problems is that the roles of key participants in the present system are vague and ill-defined. This is leading to role conflict and diffusion of responsibility for implementation.

- A complex and interrelated set of organizational entities affects decision-making for the Arizona university system. However, no concise or consolidated definition exists which delineates the charter, role, responsibility, or expectations of these entities. Where definitions do exist, they tend to emphasize process or review functions rather than results. Specific task or product responsibilities are rarely noted and deadlines are conspicuously absent.

- A crucial problem is that the roles, responsibilities and authorities of the Council of Presidents (which consists of the three university presidents and the Board's executive director), are conspicuously ill-defined, especially with respect to implementation of Board policy. No written objectives or charter have ever been established for this critical organizational entity.

Another major contributor to the problem symptoms is the fact that system level decision-making processes at the Board level are overly rule-bound, cumbersome and inefficient.

- The concept of "collegiality"--i.e., highly participatory, consultative and consensus-oriented decision-making-- appears to govern not only university decision-making processes, as is traditional, but also the statewide Board level decision-making process. The extension of collegiality into regental decision-making, combined with vague roles and a limited number of players is resulting in more meetings and more time being spent to support system level meetings than in any other university system we have observed.

DECISION MAKING AND SUPPORT RESPONSIBILITIES

1204

		BOARD COMMITTEES						EXECUTIVE COUNCILS				
	BOARD OF REGENTS	Finance	Capital Review	Acad / Stud Affairs	Public Affairs	Strategic Planning	Human Resources	Council of Presidents	Academic Affairs	Business Affairs	Student Affairs	Legal Affairs
D. G. Shropshire, President	●	●	●	●	●	●	●					
E. S. Auslander	●	●		●		●	●					
E. N. Capin	●	●	●				●					
H. Chanen	●		●		●	●						
J. P. Mikitish	●	●	●	●	●	●	●					
A. J. Pfister	●			●	●	●						
D. Pitt	●		●	●		●						
T. A. Tachias	●		●		●		●					
R. Watkins, Jr.	●	●					●					
Gov. R. Mofford (ex officio)	●											
Supt. C. D. Bishop (ex officio)	●											
J. RUSSELL NELSON, President	●							●				
C. ROLAND HADEN, V.P. Academic Affairs	●			●		●			●			
BETTY TURNER ASHER, V.P. Student Affairs	●			●							●	
BRENT W. BROWN, V.P. University Relations	●				●					●		
VICTOR ZAFRA, V.P. Business Affairs	●	●	●		●	●	●			●		
BRUCE MEYERSON, General Counsel	●											●
OTHER EXECUTIVES AND STAFF	●	●	●				●			●		
E. M. HUGHES, President	●							●				
FRANK BESNETTE, Executive V.P.	●	●	●				●			●		
D. MARKEE, V.P. Student Services	●			●							●	
PATRICIA REED, V.P. Academic Affairs	●			●		●			●			
OTHER EXECUTIVES AND STAFF	●	●	●		●		●			●		
HENRY KOFFLER, President	●							●				
NILS HASSELMO, Sr.V.P. Academic Affairs	●			●		●			●			
BEN J. TUCHI, Sr.V.P. Finance & Admin.	●	●	●				●			●		
GEORGE R. CUNNINGHAM, V.P. Admin.Svcs.	●	●	●				●			●		
DUDLEY WOODWARD, V.P. Student Affairs	●			●							●	
ALAN BEIGEL, V.P. University Relations	●				●							
JAMES RICHMOND, Legal Counsel	●											●
OTHER EXECUTIVES AND STAFF	●	●	●	●		●	●			●		
MOLLY C. BROAD, Executive Director	●	●	●	●	●	●	●	●				
JACQUELINE SCHNEIDER, Legal Counsel	●	●	●		●							●
ODUS V. ELLIOTT, Assoc.Dir. Academic Prog.	●			●		●			●		●	
ROBERT LAWLESS, Assoc.Dir. Finance	●	●	●				●			●		
ROBERT WILLIAMS, Assoc.Dir.Capital Dev.	●	●	●				●			●		

- Additionally, the small size of the Board, the relatively large number of Board committees, and the relatively large membership on each Board committee combine to place extreme demands on individual regent's time. The combination creates a "logistical nightmare" in scheduling and coordination of these meetings.

- The composition of staff councils and the traditional use of these councils to "staff" Board committees is causing role conflict and inefficient utilization of university staff resources. The strains caused by this practice are at their most severe for members of the Business Affairs Council. We estimate that members of this council are spending well over half their time on systemwide projects related to such meetings.

- Because current structures and processes diffuse responsibility for implementation, top-down policy direction by the Board has no single implementation focal point. Such initiatives must instead filter through a complex web of committees and councils.

- Current decision-making practices thus promote the development of a state level policy for the Arizona universities based on the "accretion" of individual university decisions. They do not support coordinated pursuit of a statewide strategic vision of the universities.

Delegation of authority from the Board to the university presidents is a third critical issue affecting university efficiency and effectiveness.

- To the extent that the Board has no specific authority to delegate, the Board itself must exercise such authority collectively. If insufficient latitude for action is delegated, the Board will find itself involved in management level decisions which are inappropriate for a governing body.

REPRESENTATIVE DECISION MAKING SUBJECT AREAS		BOARD COMMITTEES						EXECUTIVE COUNCILS				
	BOARD OF REGENTS	Finance	Capital Review	Acad / Stud Affairs	Public Affairs	Strategic Planning	Human Resources	Council of Presidents	Academic Affairs	Business Affairs	Student Affairs	Legal Affairs
Budgets (all)	●	●	●		●			●		●		
Finance & Accounting	●	●	●					●		●		
Audits	●	●						●		●		
Fees & Tuition	●	●		●		●		●	●	●		
Third Party Relationships	●	●						●		●		
Capital Budgets	●	●	●			●		●		●		
Capital Development Process	●		●			●		●		●		
Real Property Transactions	●		●					●		●		
Academic Degree Programs	●			●		●		●	●			
Academic Organizational Units	●			●				●	●			
Academic Personnel Policies	●			●			●	●	●			
Student Affairs	●			●		●		●			●	
Articulation Policies	●			●		●		●	●		●	
Governmental Relations	●				●			●		●		
Legislative Relations	●				●			●		●		
Public Affairs	●				●			●		●		
Enrollment Projections	●					●		●	●			
System / University Missions	●					●		●	●			
System / University Goals	●					●		●	●			
System / University Strategies	●					●		●	●			
Systemwide Stragegic Plan	●					●		●	●			
Board Personnel Policies	●			●			●	●		●		
System Human Resources Plan	●			●			●	●		●		
Affirmative Action Plan	●						●	●		●		
Personnel Management Systems	●						●	●		●		
Classified Personnel	●						●	●		●		
Student Financial Aid	●	●		●				●		●	●	
Code of Conduct	●			●				●			●	
Student Health Insurance	●			●				●			●	
Legal Issues	●							●				●

- The Board has not given adequate attention to the policy decisions relating to identification of areas of authority to be delegated to the university presidents and the development of specific guidelines to facilitate such delegation.

- Absence of legislative guidelines coupled with a lack of attention to the policy question above, is simultaneously drawing the Board into areas of detailed management decision-making and away from policy development, advocacy and strategic decision-making.

The lack of a statewide strategic agenda for this system is another critical problem.

- No statement of mission or strategic plan exists for the Arizona university system as a whole. The mission must be interpreted based on constitutional and legislative authorizations. This lack of framework for Board level policymaking leads to case-by-case decision-making without an overriding point of reference.

- The absence of a mission and a plan means that no clearly articulated public consensus exists on where and how state monies should be spent within the three universities. No consensus exists on which programs in which institutions should be targeted as centers of excellence (or candidates for dismantlement), or where the state should target monies to achieve certain statewide goals not currently being addressed by the institutions.

Information to support board decision-making and policy development is collected inefficiently and presented ineffectively.

- Political, social, financial, and legal realities are enlarging the role of the Arizona Board of Regents in the destinies of the three Arizona universities, and simultaneously heightening the importance of the decisions it makes. The Board needs relevant information to make these decisions.

- However, the Board's information requirements have never been formally defined, and it maintains no information systems of its own. Consequently, the Board is being offered an enormous amount of data about the three universities. Some of this is helpful, but much of it is confusing, and in some cases, irrelevant.

- Simultaneously, increasing ad hoc Board requests for specialized information have become extremely burdensome to the universities. University information systems--designed to meet specific operational needs of the campus--have not been designed to support such requests. These generally rigid operating systems often requires more time and effort to respond than the question warrants.

- The absence of a capability to demonstrate linkage between budgets, performance measures, program evaluations, and strategic plans at both the university level and at the Board level is a critical organizational weakness which could threaten the universities' and Board's autonomy as Arizona state government spending comes under increasingly critical scrutiny.

- Financial and performance reporting from the universities to the Board can be materially improved, if budgets are explicitly linked to strategic goals and reflect the results of performance appraisal, program analysis and evaluation. The Board's failure to define its expectations with respect to monitoring the performance of the universities has created an inefficient and ineffective accountability relationship among the universities, the Board and the legislature.

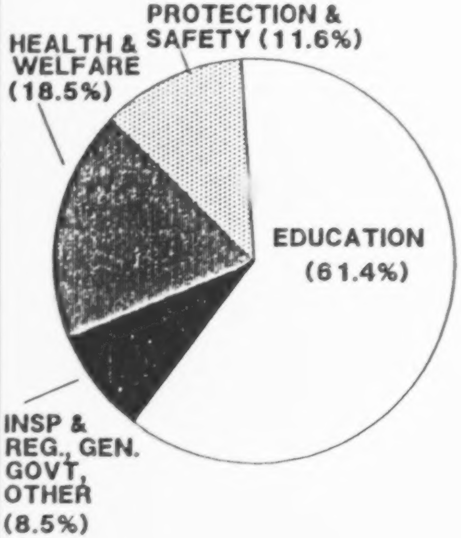
- The Board's annual budget review process, for example, fails to result in an adequate Board evaluation of the universities' continuation budgets, which represent 95 percent of all state appropriations for the universities. Moreover, inadequate internal performance measures beyond traditional budget monitoring hinder the universities' abilities to efficiently manage their own resources and impedes accountability of subordinates to supervisors, universities to the Board, and the Board to the legislature.

In our opinion, the organizational, planning and information weaknesses described above are the most significant problems facing the system. Finding a solution merits the Board's top priority and immediate attention.

The impact of these problems on the abilities of the universities and Board to respond to future opportunity and changes outweighs the impact of any other area we studied. These problems are resulting in operational inefficiency. They stand in the way of the system exploiting its formidable competitive strengths. They hinder the universities' pursuit of excellence by chewing up precious time, breeding conflict and clouding vision of the future.

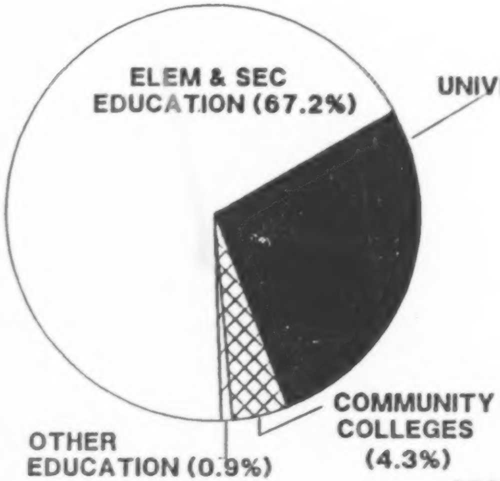
State of Arizona and Arizona University Funding FY88

ARIZONA
STATE GENERAL
FUND APPROPRIATIONS



$2,570,438,600

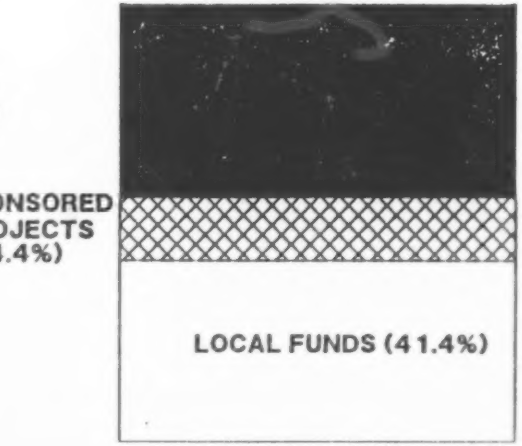
GENERAL FUND
APPROPRIATIONS FOR
EDUCATION



$1,576,385,100 *

* Excludes State Funded Building Renewal of $8,689,000 and General Fund Capital Outlay of $12,993,500 (ASU-West).

UNIVERSITY FUNDING



$982,915,200

5. ASSESSMENT OF THE FUNDING AND APPROPRIATIONS PROCESS

A sound funding mechanism should rationally and consistently allocate funds to support pre-determined objectives and should measure the outcomes of the activities funded.

In this context, the Arizona funding process was evaluated against four basic criteria:

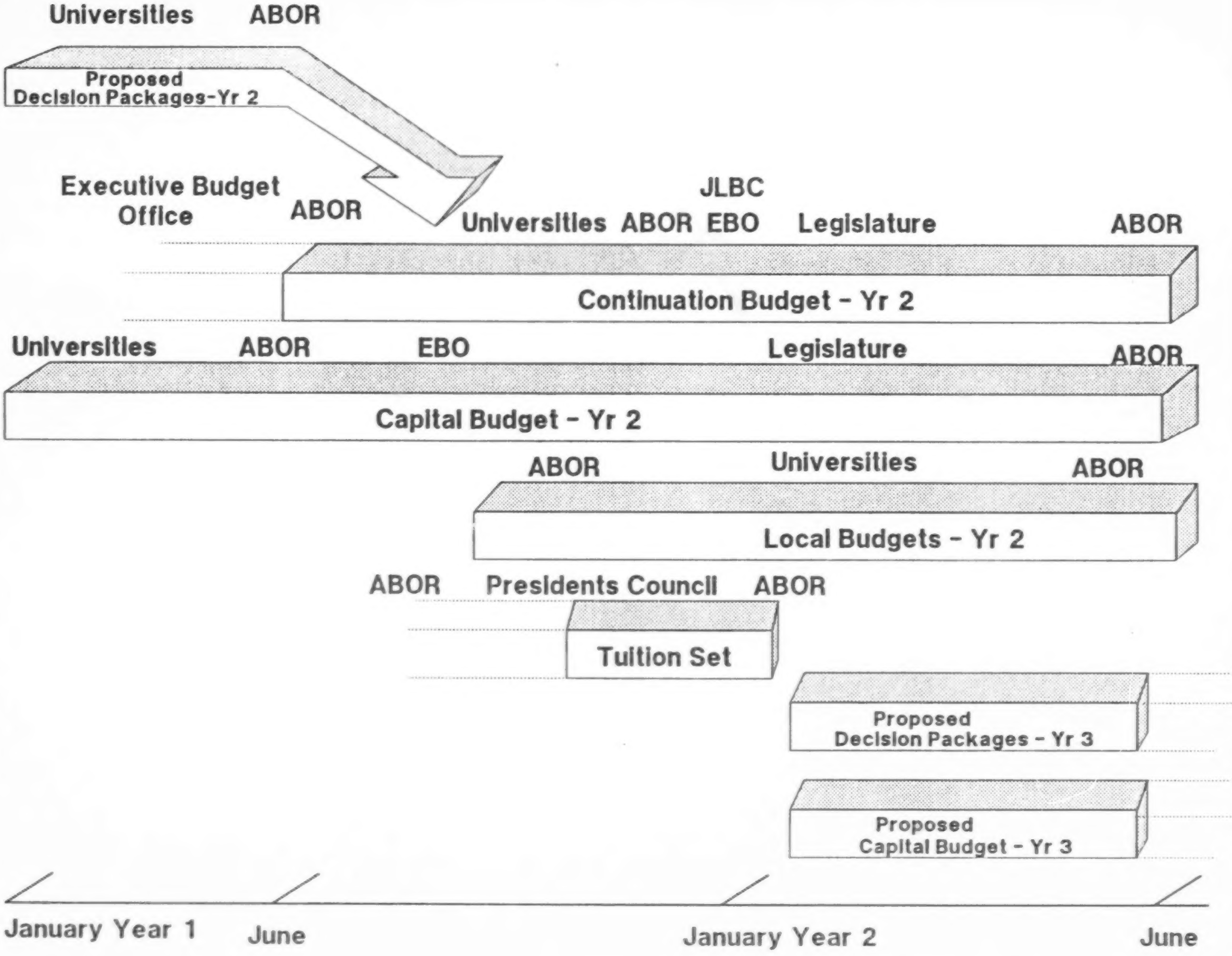
- A sound funding mechanism should be integrally linked to statewide plans and priorities as well as to institutional missions and goals.
- The funding process should ensure, to the extent possible, stability, predictability and continuity in base budgets.
- Institutional autonomy and flexibility should be provided-for and nurtured through the funding process.
- Institutions should be held accountable for the funds invested with them.

1211

The mechanism through which the universities receive their funds is a complex series of relatively independent processes which occur over an 18-month timeframe and consists of continuation budgets, decision packages, local funds budgets and capital budgets.

- Although the mechanics of this process are relatively clear, the ultimate form and outcomes of the process are affected by its numerous elected and appointed participants and the competing demands for finite resources required to balance the state's budget.
- Since 1978, the State has been pressured to increase the share of funds appropriated to programs such as health care and prisons. As a result higher education's share of total state expenditures has declined, from over 24 percent in 1978 to less than 20 percent in 1988.

UNIVERSITY BUDGET PROCESS



Universities ABOR

Proposed
Decision Packages-Yr 2

Executive Budget
Office

ABOR

JLBC

Universities ABOR EBO Legislature ABOR

Continuation Budget - Yr 2

Universities ABOR EBO Legislature ABOR

Capital Budget - Yr 2

ABOR Universities ABOR

Local Budgets - Yr 2

ABOR Presidents Council ABOR

Tuition Set

Proposed
Decision Packages - Yr 3

Proposed
Capital Budget - Yr 3

January Year 1

June

January Year 2

June

The lack of a clear statewide plan for higher education and measurable institutional expectations promotes conflict and raises concerns about under and over-funding. Quantitative and qualitative expectations which might guide funding for Arizona higher education are not well articulated or clearly understood.

- Specific statewide educational issues which will face Arizona over the next twenty years, such as a growing minority population, increasing attrition rates, or the need for more elementary and secondary education teachers have not been formally addressed with respect to their funding implications, Consequently, questions about under- or over-funding will inevitably be followed by the question, "Compared to what?" With no clear measurable educational agenda, expected outcomes and measurement criteria will remain clouded and vague, and questions of equity and adequacy will remain largely unanswerable.

- Lacking clear plans and priorities, the current funding process exacerbates tendencies to commit major current and future expenditures committed in a "hurry-up" mode without clear and compelling justification that they are in the best interests of the State or that they represent the State's highest priority choices for the allocation of scarce resources.

- Arizona funding mechanisms provides few incentives for the three universities to maintain and achieve targeted areas of quality and excellence. The issues of quality and excellence are undefined at the state level and seem to be, simply, "Be all that you can be." Specific objectives are lacking, e.g., to to enhance economic development of the state, to provide guarantees for future employment needs or to promote technology transfer.

While providing some stability and predictability for the universities, the present funding process tends to preserve historical funding inequities and establishes an environment promoting short-range decisions.

- Despite distinctly different institutions, Arizona's funding process treats the three institutions homogeneously, allocating to each a "fair share" of what the state can afford.

- Indexing institutional base budgets and providing faculty through the "22:1" formula provides an illusion of stability by accommodating enrollment growth and "equitable" distribution of funds. However, this formula does not differentiate between programs (chemical engineering versus English, for example), which have quite different per student and per faculty support costs.

- The funding process paradoxically encourages and discourages growth. Base budgets are preserved only as long as enrollments are stable or increasing, thus promoting enrollment growth. Yet the formula provides only for faculty and limited faculty support, and does not adequately support the universities' associated infrastructure or administrative needs.

- This process, coupled with recent state revenue short-falls, has exacerbated a "spend it or lose it" environment which promotes short-term, reactive decisions.

Institutional spending autonomy is a hallmark of Arizona's universities and should be preserved.

- The three universities have considerable freedom and flexibility in the management of their institutions. Their three-line appropriation is, in effect, a lump sum appropriation possessing a notable and appropriate absence of legislative restrictions or explicit legislative expenditure directives when compared to most other states.
- This degree of university autonomy has been pivotal in allowing the universities to manage recent budget cutbacks. Their ability to easily transfer funds and manage vacancy savings has provided the latitude necessary to maintain services at an acceptable level in spite of massive and disruptive mid-year budget cuts.

1215

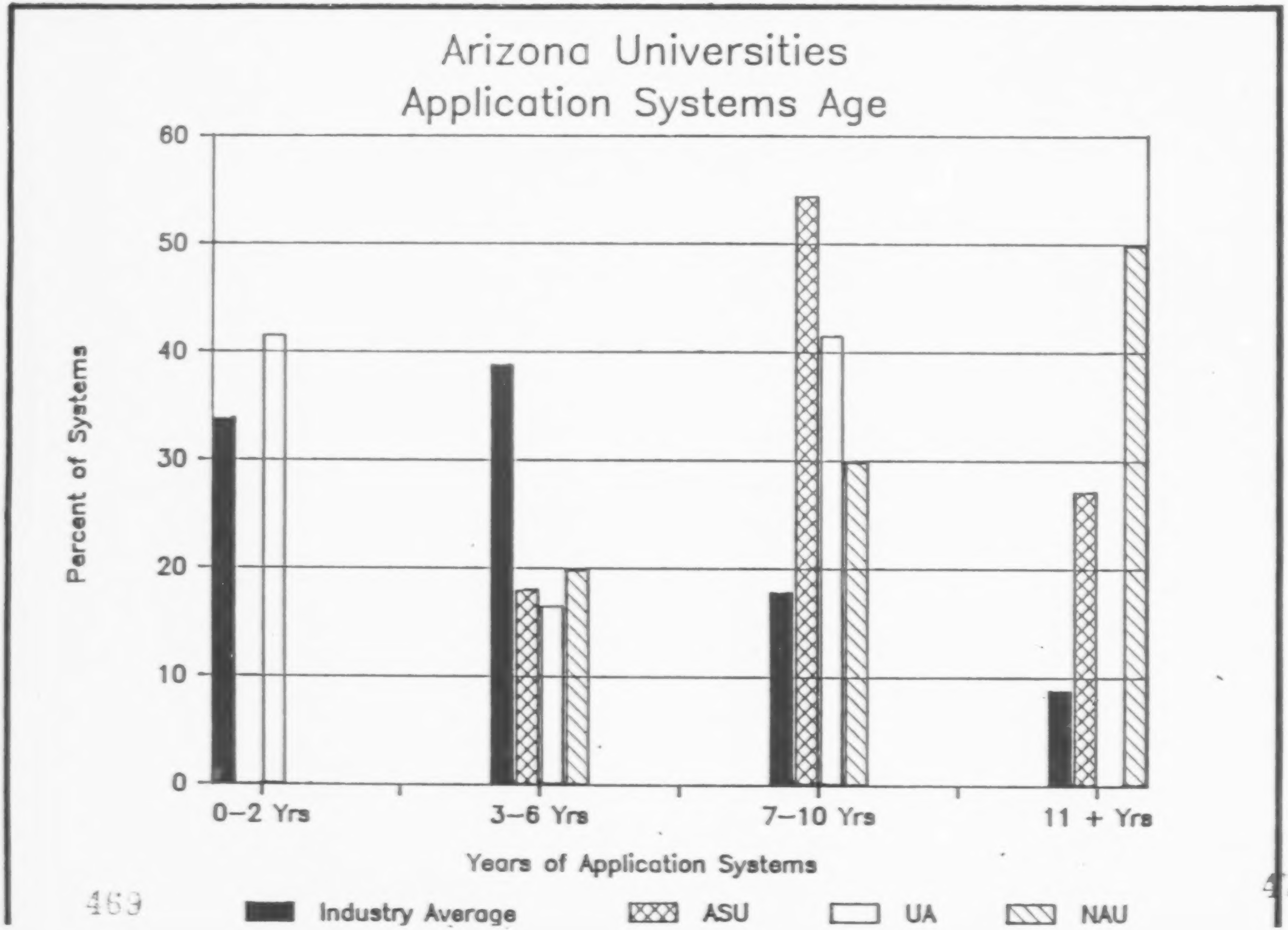
While granted substantial autonomy, the universities are held largely unaccountable for the state's investment in them.

- Beyond financial audits and excruciatingly detailed appropriations requests, there are few measures which hold the universities accountable and provide informed tracking of results against funded objectives. While financial audits and balanced budgets offer some assurances and demonstration of acceptable stewardship of assets, they do not attest to or assure efficient or effective use of these resources.
- Recent movements toward accountability have tended to be ad hoc and idiosyncratic, lending the appearance of micro-management. The Board has asked questions which appear inappropriately detailed for their role as policymakers. However, the answers to those detailed questions have been perceived to be inadequate, thus increasing Board concerns about management and leading to even greater depths of specificity of inquiry--creating a vicious cycle.

In summary, Arizona's higher education system is handicapped by a funding system which, lacking the "anchor" of a clear statewide vision, encourages short-term thinking, handles growth and retrenchment poorly and is insensitive to investment outcomes.

The opportunities for significant change in this area can only be exploited if a prerequisite condition is met: a clear vision and explicit priorities must be articulated for the future of the Arizona university system. The funding process must be linked to the achievement of this vision and promote the achievement of identified priorities. Unless these changes occur, progress toward the achievement of quality, equity, efficiency, effectiveness and accountability simply cannot be measured.

1216



Arizona Universities
Application Systems Age

6. ASSESSMENT OF INFORMATION SYSTEMS AND TECHNOLOGY

Our management review of information systems and technology focused on the use of computers, information systems, and telecommunications to support the administrative activities of the Arizona universities. Our assessment is summarized below.

Administrative information systems which support university business operations have not kept pace with user needs for timely and accurate information, causing user abandonment of central systems, duplicative efforts and high maintenance costs.

- The universities spent over $27 million in 1986-87 on computing services to support research, instructional and administrative activities. In addition to these formally identified expenditures, significant expenditures are being incurred for computers and systems professionals by individual departments.

- The systems at all three of the Arizona universities were designed in the 1970's to meet the transaction processing requirements for specific departments. They were not designed to provide management and decision support information to a larger audience. As a result, many departments in the universities are relying less and less on the information contained in the central computer systems, and are maintaining duplicate records on personal computers or paper files.

- The aging of the administrative applications in the Arizona universities, very high percentages of time being spent in maintenance activities, and significant maintenance backlogs indicate the universities are probably spending too much on maintaining these old systems.

APPLICATION SYSTEMS DEVELOPMENT AND IMPLEMENTATIONS

	Age in Years			Plans to Replace?			Estimated Costs (000's)		
	ASU	UA	NAU	ASU	UA	NAU	ASU	UA	NAU
1. General Ledger	13	10	12	88	88	91	$2900	$700	$1700
2. Accounts Receivable	10	10	3	?	88	91	-	$700	See Gen. Ledger
3. Accounts Payable	13	10	12	88	88	91	See Gen. Ledger	$700	See Gen. Ledger
4. Student Records	7	1	7 *	no	N/A	no	-	-	-
5. Admissions	8	1	8 *	no	N/A	no	-	-	-
6. Registration	7	1	7 *	no	N/A	no	-	-	-
7. Purchasing	13	9	12	88	89	91	See Gen. Ledger	$600	See Gen. Ledger
8. Payroll	8	8	11	90	no	90	See Human Resources	-	$900
9. Human Resources	8	6	-	90	no	90	$1900	-	See Payroll
10. Budget	6	4	11	no	no	91	-	-	See Gen. Ledger
11. Student Billing	See Accts Rec.	1	See Accts Rec. *	no	N/A	no	-	-	-
12. Financial Aid	5	2	5 *	no	N/A	no	-	-	-

* Acquired from ASU two years ago

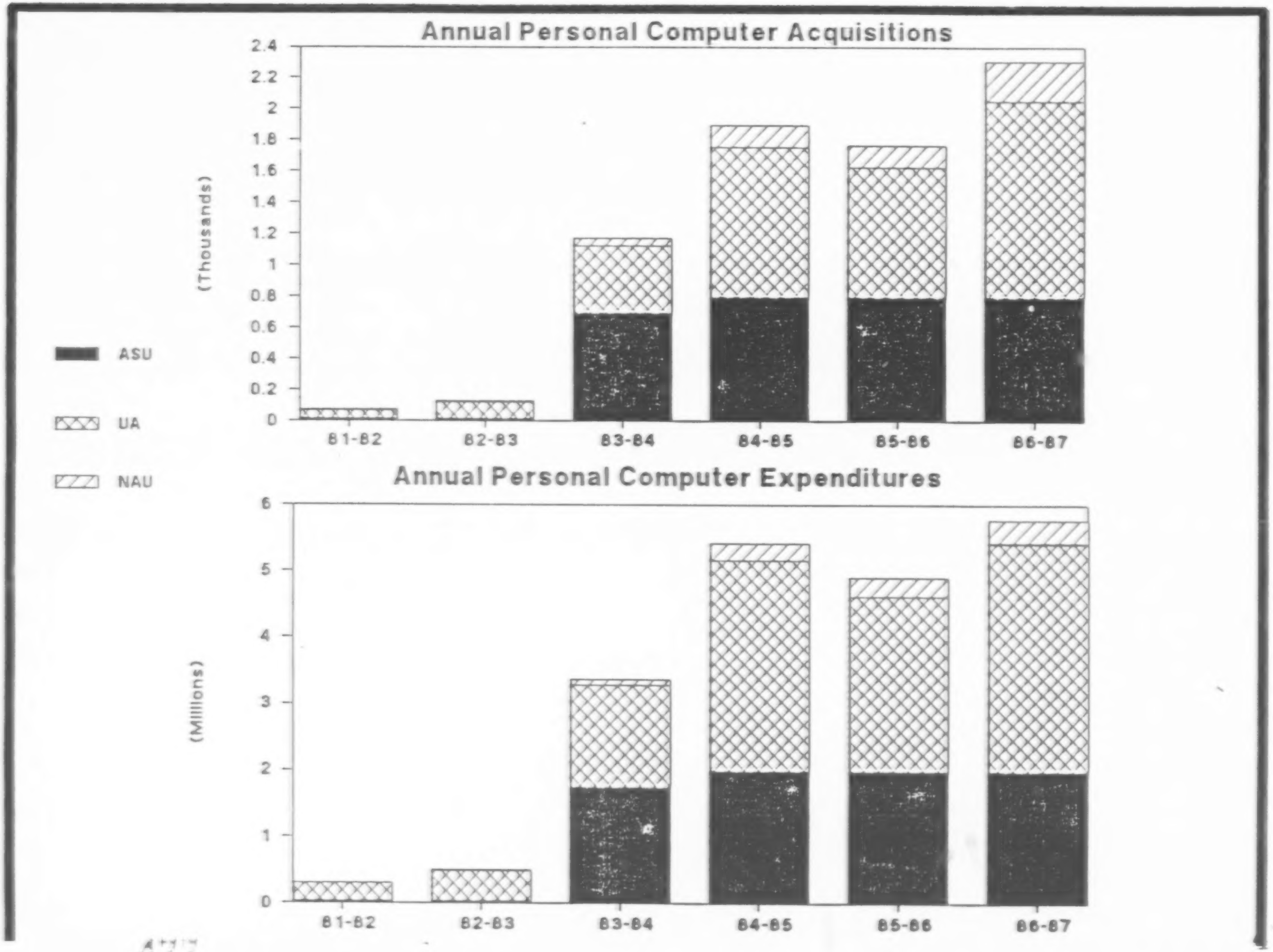
Over $10 Million Investment

The universities are not strategically planning their information systems and computing services to directly support their business goals and objectives.

- In response to their increasingly obsolete systems, the universities are investing a combined $10 million in major efforts to replace selected administrative information systems. These major projects merit independent implementation reviews for the purposes of controlling risk and insuring that the systems will ultimately meet user requirements.
- Long-range planning for information systems at the Arizona universities is operational and budget driven rather than strategic.
- Information systems plans which do exist generally cover only a one to two year timeframe, lack a linkage back to university objectives or long-term goals, and do not provide for the expectation and management of technology change.
- Inadequate attention is being paid to integration of application systems and databases. Data administration policies related to the creation, "ownership," and management of university data resources are only in their infancy.

The rapidly increasing use of personal computers is stimulating the need for new management and data administration policies on the three campuses.

- In 1982, the three universities together owned just 200 personal computers. Today they own 8,200 and have invested over $21 million in these assets over the last five years. However, management of these assets is fragmented and uneven at each of the universities. For example, Arizona State University has developed good organizational capabilities to support end-user personal computing, but such support is weak to non-existent at Northern Arizona University and the University of Arizona.


Annual Personal Computer Acquisitions
(Thousands)
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
81-82
82-83
83-84
84-85
85-86
86-87
ASU
UA
NAU
Annual Personal Computer Expenditures
(Millions)
6
5
4
3
2
1
0
81-82
82-83
83-84
84-85
85-86
86-87

- University databases are not easily accessible to faculty and staff for personal computing. Data must frequently be manually re-entered and separately maintained, resulting in losses of data integrity, and duplication of effort. Electronic mail systems are installed at all three campuses, but are underutilized. Access to electronic mail is often restricted to upper management. Clerical staff and individual faculty members--who might benefit the most from paperwork reduction and accelerated communications--must rely on superiors' systems and paper-based interoffice mail networks.

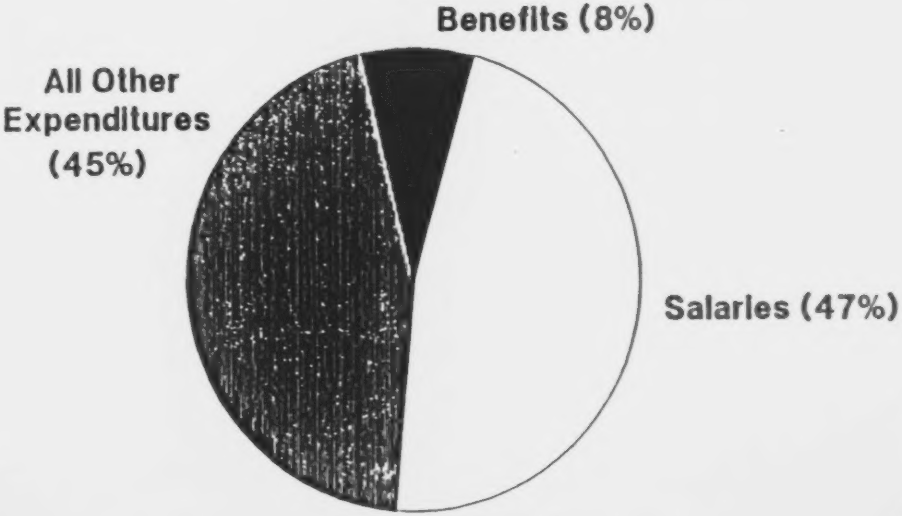
The universities have only recently begun to collaborate in the area of telecommunications.

Since the break-up of AT&T, each of the Arizona universities has made major changes in its telephone systems and data communications. However, these activities were undertaken independently by each university, and as a result three separate systems were procured.

The State of Arizona is currently developing requirements for a statewide telecommunications network for voice, data and video communications. A commendable system level effort has been undertaken to identify opportunities for the universities to make the best use of this planned state network.

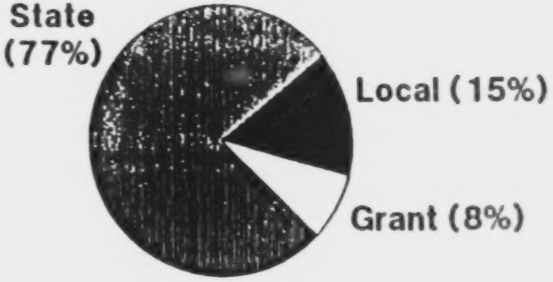
In summary, information systems at the Arizona universities are being planned and implemented tactically, not strategically. An operational, budget-driven systems planning emphasis coupled with inadequate attention to implementation risks, user needs, and integration to support the evolution of the university as a whole is exposing the universities to undue risk that future systems will not meet future needs.

The Arizona Universities
Employee Salaries by Funding Source
1986-87



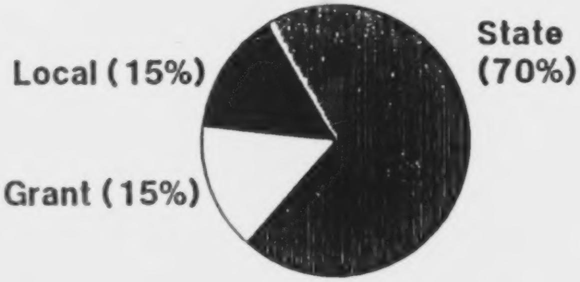
$952,000,000

1984-85



$341,914,000

1986-87



$446,045,000

7. ASSESSMENT OF HUMAN RESOURCES MANAGEMENT

Our management review of human resources focused on both system level and university personnel policies and practices involving the planning, budgeting, deployment, and control of resources which represents the universities' largest single object of expenditures. Our assessment is summarized below.

The Board lacks a comprehensive human resources philosophy for all employee groups.

- In 1986-87, the Arizona universities spent over $446 million on wages and salaries and another $73 million on employee benefit programs for its 17,000 employees. This represents over half the universities expenditures for all purposes, yet no coordinated systematic approach to managing these resources exists.

- This has resulted in a fragmented, inefficient and risky approach to managing this crucially important resource and is resulting in inconsistency of job assignments, outdated classification descriptions and probably an excessive number of job classifications.

- The Board's human resources policies focus primarily on a systemwide view of classified staff. Policies related to management of non-classified personnel, especially administrative and non-faculty professionals, are spotty and uncoordinated.

- The most significant impact of this lack of a systemwide philosophy is that no coordinated mechanism exists for setting compensation levels relative to other universities and businesses in the same labor market for non-academic professionals or administrative employees. This may be resulting in inconsistencies in compensation levels for specific positions across the universities, which in turn could be detrimental to employee morale, could result in excessive compensation costs, and could expose the universities to unwarranted risk.

The Board and each of the universities lack rudimentary capabilities in the area of position control and manpower planning.

- Despite the fundamental significance of human resources to overall budgets and operations, no systematic process exists to demonstrate or evaluate whether budgeted human resources reflect the actual staffing requirements of the universities.
- The current position budgeting approach does not promote strategic reassessment of human resource needs or strategic planning to meet these needs. Rather than budgeting positions based on trends in enrollment, type of programs or other performance or output indicators, staffing projections are primarily based on prior year staffing levels.
- Inadequate position control can also cause duplication of efforts between departments, or gaps in which certain necessary functions fail to be performed.

Personnel management and recordkeeping processes at all three universities are generally fragmented and inefficient.

- Each of the universities has established its own methods for dealing with recordkeeping requirements as needs have arisen. This is resulting in duplicative personnel management activities being performed in a multitude of departments throughout each university. For example, a significant number of employees are involved in the manipulation and processing of personnel data, including employees in personnel, finance and institutional research offices, as well as in individual "customer" departments themselves.

- The use of home grown recordkeeping systems and the fragmentation of human resource responsibilities in areas such as recruiting/applicant tracking, compensation and employee benefits could also result in risks associated with inadvertent non-compliance with the numerous and highly technical laws and regulations governing personnel management.

- Considerable criticism was directed by users regarding each university's ability to recruit and hire appropriate personnel quickly and reclassify jobs in a timely manner. This problem appeared to be especially acute in terms of its impact on sponsored research projects.

1226

Administration of employee benefit programs, which account for eight percent of all university expenditures, could probably be made more cost-effective.

- The Arizona universities benefit programs are currently administered through the State Department of Administration on a fully insured funding arrangement. Businesses or organizations employing over 300 employees often find it economically advantageous to fully or partially self-insure dental and medical benefits.

- Despite the number of employees currently participating under the health and dental benefit programs, to the best of our knowledge, no independent audit of claims has been conducted to determine the accuracy of payments in accordance with programs and policies. In our experience, such claims audits typically uncover payment errors in the range of several percent of total claims paid.

- No review of the administration costs of the universities' medical cost containment programs has been to evaluate whether such costs might be exceeding the savings from these programs. Additionally, a high penetration rate of health maintenance organizations (HMOs) could adversely affect financial performance of the "fully insured" medical and dental plans.

In summary, human resources management issues, in general, are not receiving the attention called for by the critical importance of "the human factor" to both university operations and university budgets.

ARIZONA UNIVERSITIES PHYSICAL RESOURCES

Ten Year Comparison

Fiscal Year 1976-77		Increased By	Fiscal Year 1986-87
$27 Million	Budget	120%	$60 Million
$890 Million	Replacement Value	80%	$1.6 Billion
713	Buildings	17%	833
12.1 Million	Gross Square Footage	45%	17.6 Million
1,227	Physical Resource Staff	11%	1,358
61,600	Student FTE	10%	67,900

8. ASSESSMENT OF PHYSICAL RESOURCES MANAGEMENT

Physical resources management at the Arizona universities is a $60 million dollar a year operation responsible for the care, upkeep, and renovation of 800 buildings sited on almost 2,000 acres of land with a combined estimated replacement value of $1.6 billion dollars. The Physical Resources Departments at the three universities employ approximately 1,300 people ranging from custodians and grounds-keepers to highly qualified specialists and administrators. Our assessment of this area is summarized below.

The timeliness, productivity and customer relations of physical resources departments at all three universities could be improved with automation, performance standards, and better communication.

- Existing work estimating and job tracking systems are inadequate in light of industry norms. Large work backlogs exist in some trades, yet no outlets exist for peak workload demands other than expensive overtime and very limited contracting out. Very few estimates of overall backlogs for specific trades are being made. Consequently, the volume of outstanding work is not being adequately measured, staffing requirements are unknown and planning and scheduling of jobs and staff resembles a "firefighting" exercise.

- "Customers" of physical resource departments at all three universities expressed concern about high costs, long lead times, lack of a "service orientation" and the efficiency of physical resource functions.

- An absence of rudimentary performance standards and performance measures hinders evaluation and control of the universities' physical plant management functions. The written objectives of the departments are largely qualitative in nature and do not address specific quantitative objectives of timeliness and responsible cost. As a result, performance measures and reporting are not widely in place to monitor and control productivity, quality, timeliness and cost or to support priority setting.

Physical Resources Automation

	Automation		
Description	**ASU**	**UofA**	**NAU**
Work Order Management	●	●	●
Scheduling	◒	●	◒
Preventive Maintenance	◒	⊗	⊗
Energy Management	◒	◒	◒
Customer Chargeback	◒	◒	◒
Space Planning	◒	●	◒
Space Scheduling	○	○	◒
Deferred Maintenance	○	○	○
Locksmith	⊗	○	●
Performance Reporting	○	○	○

● **Good to Excellent** ◒ **Poor to Fair** ⊗ **In Progress** ○ **Not Automated**

- Automation has been used extensively in some physical resources areas, while other areas remain dependent on manual operations. The chart on the facing page is a summary of the extent to which key specific functions are supported by automation at each of the universities.

According to one "rule of thumb" estimate, the Arizona universities are annually underfunding physical plant maintenance by nearly $4 million, thus contributing to an ever growing accumulation of deferred maintenance which could exceed $80 million when finally measured.

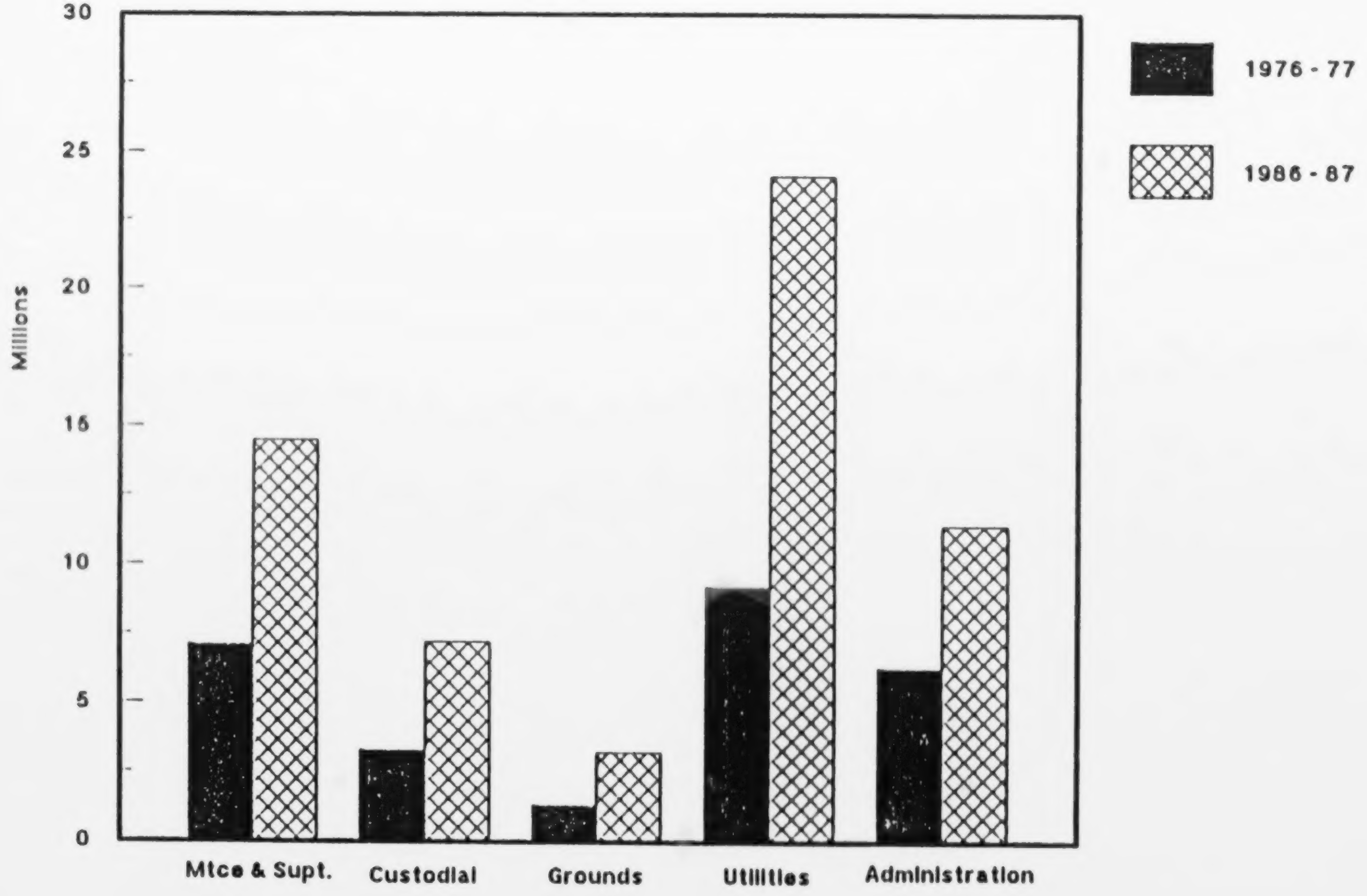
- The actual severity of this problem is unknown because the universities' current abilities to measure deferred maintenance are, at best, mixed. Northern Arizona University is the only institution which has completed an objective assessment of its deferred maintenance problem to date, and has estimated the scope of the problem to be nearly $19 million, or 6% of NAU's estimated replacement value.

- Commendable efforts are now under way to measure and fund the facility deferred maintenance problem through the establishment of a university "building renewal program" in 1985. However, this program could be inadequate when final deferred maintenance amounts are tallied for all universities. At current rates of building renewal funding, it will take years to reduce this liability while continuing to fund the annually recurring preventive maintenance requirements at an appropriate level.

Unnecessarily low thresholds imposed by state statute requiring the competitive procurement of outside maintenance and repair services are wasting the universities' time and money.

- The human efforts and time delays associated with bid document preparation for very small jobs may be costing, in some cases, as much as the contracted work itself.

Arizona Universities
Physical Plant Budget Growth - 1976-1986



- Management has no flexibility to determine whether certain jobs over $10,000 could be more efficiently accomplished in-house or contracted out.
- Many major public universities in other states impose no such dollar limits on the internal performance of required work by physical resources departments.

The universities' space management capabilities vary widely.

- The institutions are responsible for the efficient utilization of nearly 18 million gross square feet and 11 million net assignable square feet of classroom and other facilities. However, little relevant information is maintained or analyzed regarding the types and sizes of facilities available at Northern Arizona University and Arizona State University.
- The University of Arizona was the only university which could demonstrate an adequately functional space inventory and space management capability. ASU and NAU have each begun projects to upgrade their space management capabilities but neither university has consulted with the University of Arizona to review the capabilities or design of its space management system.

The lack of automation to support classroom scheduling functions is increasing the difficulty of efficient space and classroom utilization, and inhibits informed decision making with respect to building new buildings or demolishing old ones.

- Classroom scheduling at all three of the Arizona universities is a highly manual, paper-intensive and change-driven process.

- The allocation and re-allocation of thousands of classrooms to accommodate thousands of classes is therefore a zealously guarded departmental asset. Departments tend to retain their space, even if enrollment in courses drops or the size of the department decreases. This tendency is due, in part, to the lack of adequate information related to the true costs of space utilization and to accounting and budgeting systems which treat space as a "free good".

- The cumulative effect is underutilization and ineffective utilization of classroom and seminar spaces.

In summary, while a number of strategically important improvements are occurring in the Board's and universities' approach to planning, managing and maintaining their physical resources, significant opportunities for improvement still exist and should be vigorously pursued.

Procurement Activity Comparisons
Fiscal Year 1986-87

Activity	Arizona State University	Northern Arizona University	University of Arizona	Total
Purchase Order Transactions Processed	17,260	9,572	34,650	58,990
Purchase Order Dollar Volume	$77,866,000	$8,981,000	$78,470,000	$166,336,000
Buyers	8	3	6.6	17.6
Avg. Purchase Order Volume per Buyer	2,160	3,191	5,250	----
Avg. Purchase Order Dollars per Buyer	$9.7 million	$2.9 million	$11.8 million	----

9. ASSESSMENT OF PROCUREMENT

In fiscal year 1986-87, the Arizona universities procured over $220 million in goods and services in support of academic, administrative and research activities. Their procurement processes should be providing cost-effective and timely delivery of goods and services for academic, administrative and research activities, and should be providing overall control over non-personnel operating expenditures. Our assessment of the procurement function is summarized below.

There is no overall management of the procurement process "as a whole" at any of the universities.

- While the purchasing function is centralized at each university, the process for managing procurement transactions and expenditures involves a variety of departments within several organizational divisions of each university.
- Each department within the process performs certain activities which contribute to overall result, but "customers" must locate and deal with several individual components of the procurement process to fulfill basic procurement needs and resolve problems.
- This type of procurement process is fundamentally a control system that happens to provide a service, rather than a service system with built-in controls. As one might expect, the resulting primary complaint of "customers" at all three universities is the inability of existing procurement systems to respond to their needs on a timely basis.

Procurement Automation

	Automation		
Description	**ASU**	**UofA**	**NAU**
Purchasing Requisition Tracking	●	○	●
Purchase Order Tracking	○	○	●
Vendor Tracking	○	○	○
Inventory Tracking	●	●	●
Interface with Accounts Payable	○	○	○
Interface with Accounting	○	○	○
Management Information	○	○	○
Accounts Payable	○	●	○

● **Automated** ○ **Manual**

The purchasing functions of the individual universities are overly dependent on manual, paper-intensive systems which cause unnecessary effort and delay, and which provide inadequate information and performance measurements for the procurement process.

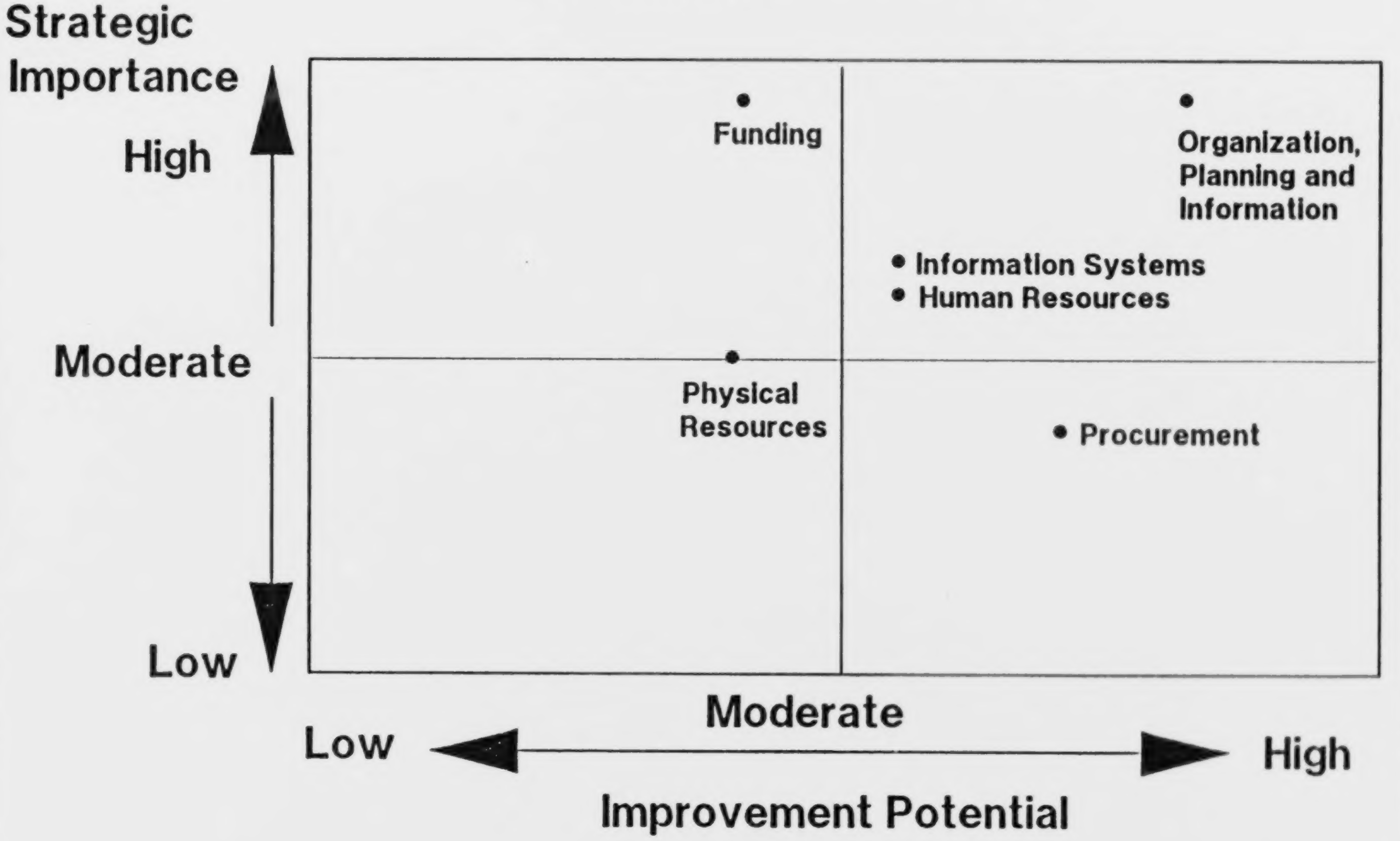
- The process tends to deal with requisitions sequentially and has difficulty sorting transactions according to size, importance, and/or complexity. The process is thus mired in paperwork and desktop bottlenecks, diminishing both customer service and buying effectiveness.
- Senior management has historically assigned a low priority to paperwork reduction and process efficiency through the automation of purchasing in comparison to other automation projects. Rudimentary departmental management information in the procurement area is therefore either unavailable or very difficult to collect, resulting in management based on "gut feel" rather than on facts.
- A lack of sufficient management information is also impeding the universities' ability to manage vendor relations.

All of the purchasing departments have taken some positive steps to improve customer service through limited dollar purchase order systems and check-with-order systems, which are designed to reduce the amount of time and paperwork involved to purchase high-volume but low-dollar goods.

In summary, fragmented control-oriented and paper-bound procurement systems are hampering overall university effectiveness by placing troublesome and time consuming barriers in the path of the day-to-day business of faculty, staff and administrators.

Relationship of Improvement Opportunities

-- Systemwide --



10. SUMMARY ASSESSMENT

The chart above portrays our summary assessment of the extent of improvement opportunity and the potential impact of improvements in each of the areas we reviewed. It is presented to give some sense of the relative priority to be attached to solutions, as discussed below.

Organization and planning weaknesses are the systems' most serious problem.

- The Arizona university system must address two fundamental weaknesses which override all others in terms of their overall impact: the lack of an articulated strategic vision for the future, and the ill-defined organizational roles, responsibilities and expectations of the participants in the system.
- As the Arizona universities enter a challenging and complex future, this simultaneous absence of "rules of the game" and "roles of the players", if left unaddressed, will hinder their pursuit of excellence, continue to result in inefficient and ineffective decision-making, and ultimately make the universities less competitive.
- Only after these two problems are solved can the system fully and adequately address problems in the funding process, statewide information and accountability requirements, and the linkage of budgets to plans and performance.
- While we found many opportunities for improvement in the specific administrative functions we reviewed, we found no "buckets of fat", and no systemic or widespread inefficiency.

- In fact, we found dedicated, highly capable and energetic managers, executives, Board members and volunteers who were devoting enormous amounts of time, energy and talent in efforts to solve the day to day problems and issues facing these complex institutions. Many were engaged in "catch up" efforts to replace or streamline old systems, procedures and ways of doing business which the universities and the system outgrew long ago and which are badly in need of replacement.

Improvements in administrative systems statewide and at the individual universities are not, however, dependent on a solution to these statewide problems.

- Most of the management problems described in the preceding pages fall into four basic categories:
    - Impediments to functional effectiveness or cost effectiveness caused by specific rules and procedures, patterns of organization, or the inadequacy of plans and standards
    - Process or cost inefficiencies caused by duplication, excessive paperwork, or lack of coordination
    - Unmeasured financial or legal risks associated with inadequate controls, poor information, or lack of coordination and attention to critical issues; and
    - Inadequate linkage between resource management practices and the mission and goals of the universities.

- Improving the way university information systems are planned and implemented will have the greatest overall impact on the efficiency and effectiveness of the universities. These systems are becoming increasingly important components of the organizational infrastructure of the universities; in the future, they will be more important than organization charts. The strategic planning and design of the architecture of these information systems is critical to ensuring that the systems evolve in concert with and reflect the strategic goals and objectives of the university as a whole, as well as the statewide goals and objectives of the Arizona university system.

- Improvements in human resources management are also likely to have a major impact in terms of risk reduction and improved linkage to strategic goals. The Board and the universities must elevate their appreciation of the overwhelming and preemptive importance of the human factor to the excellence, efficiency and competitiveness of the universities.

- Improvements in physical resources management and procurement functions at the three universities will have their greatest impact in the areas of process efficiency and cost effectiveness.

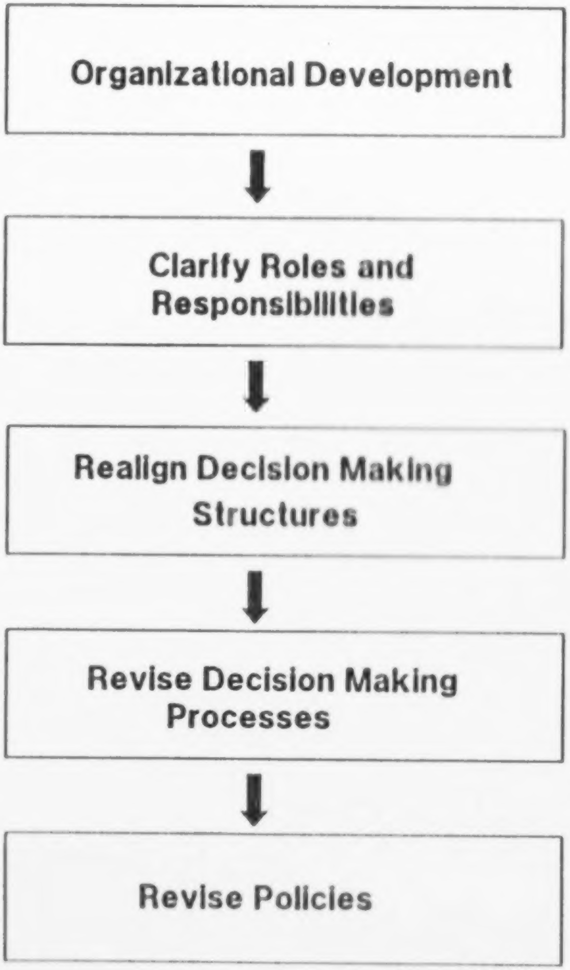
11. SUMMARY RECOMMENDATIONS

Five fundamental changes need to occur for the Arizona university system to more effectively pursue statewide excellence, efficiency and competitiveness.

- The Board of Regents should immediately undertake a project to rationalize system level organization and decision-making structures and processes.
- The Board should express a strategic vision of the future of Arizona higher education and develop a long-range strategic plan.
- Board level information and performance measurement capabilities should be developed to support strategic decision-making, to monitor implementation of a strategic plan, and to promote accountability.
- The State of Arizona should re-evaluate the higher education funding process in light of a strategic plan and should develop incentives which promote the achievement of strategic goals.
- The Board and individual universities should undertake a number of projects to improve specific resource management practices in key areas in order to reduce expenditures, increase value, reduce risk, and promote strategic goals.

Each of these recommendations is summarized in the pages which follow.

ORGANIZATIONAL IMPROVEMENT IMPLEMENTATION PRIORITIES



Organizational Development

↓

Clarify Roles and Responsibilities

↓

Realign Decision Making Structures

↓

Revise Decision Making Processes

↓

Revise Policies

12. RECOMMENDATIONS FOR SYSTEM LEVEL ORGANIZATION

The Arizona Board of Regents should immediately undertake a project to clarify and document organizational roles and responsibilities and to streamline its decision-making processes.

- A survey of Board members and the Council of Presidents should be designed and conducted to address the roles and responsibilities of each of the organizational entities comprising the Arizona university system. This survey should be compiled and presented to the Board and Council of Presidents as the initiating activity of an organizational development retreat at which the Board should agree upon and write down a set of high level goals and objectives for its state level organization and decision making structure.

- Once objectives have been defined, the Board should undertake the detailed design and implementation of structural and procedural improvements to meet these objectives. This "organizational design" activity should be undertaken in three overlapping stages, focusing first on the decision-making, advisory and implementation, roles and responsibilities of participants, then on processes, and finally on a comprehensive revision of formal policies and procedures.

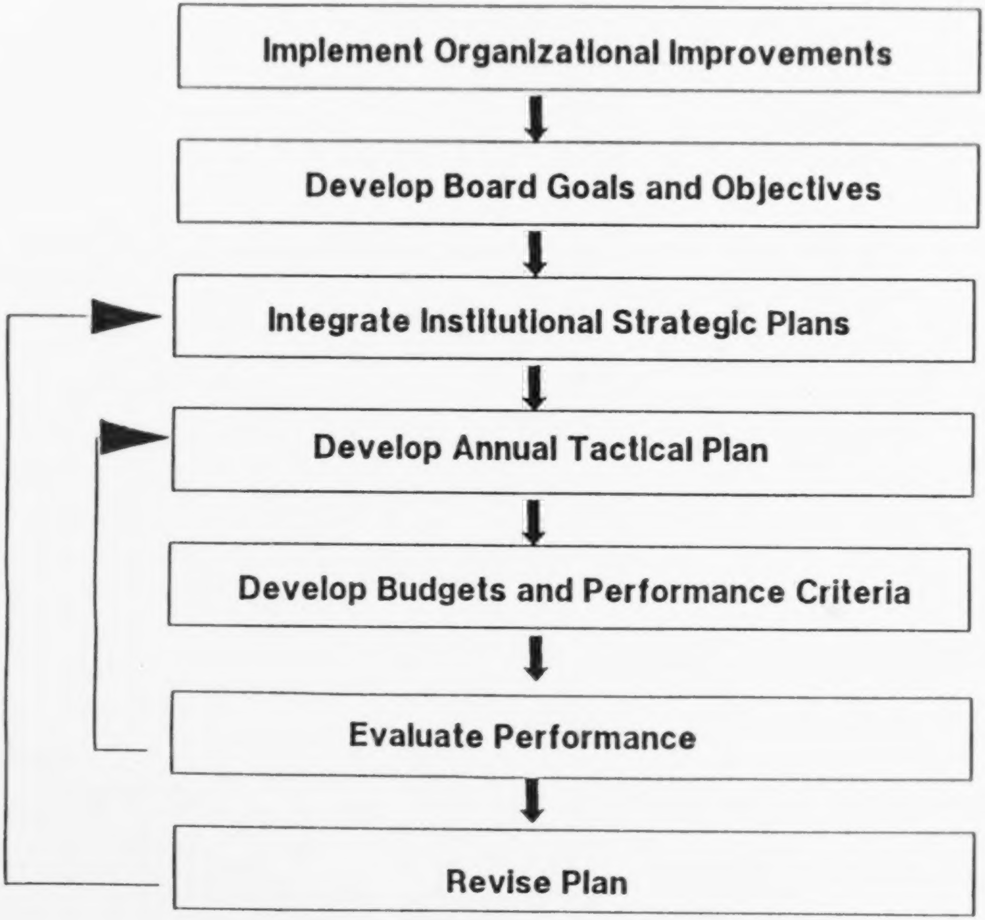
- The Board should use outside experts to assist it in implementing this recommendation to increase the likelihood of timely implementation, general acceptance, and perceived fairness and objectivity.

While organizational design was outside the scope of this project, we offer the following related recommendations:

- The Council of Presidents organization should be developed and its role and responsibility as an implementation focal point should be emphasized.
- The number of standing Board committees should be reduced, the Board should make more use of goal-oriented "task groups", and individual Board members should be assigned "oversight specialist" roles in selected areas of interest to the Board.
- The practice of routinely "staffing" Board committees with executive staff councils should be discontinued. The Executive Director of the Board should be made the focal point for organizing resources to satisfy committee staffing requirements and such requirements should be carefully and continually monitored with respect to their cumulative impact on individual time commitments.
- The Council of Presidents should reevaluate the structure and purpose of all current executive staff councils and inter-university workgroups after the preceding recommendations have been implemented.
- The tradition of one year terms for the Board President should be objectively reevaluated. In our opinion, the costs of this traditional practice outweigh its benefits.
- The Board Central Office should improve the documentation related to its internal functions, policies and procedures.
- The Board should experiment with teleconferencing in lieu of travel for inter-university committees, Board committees, and staff councils.

1246

STRATEGIC AND TACTICAL PLANNING IMPLEMENTATION SEQUENCE



Implement Organizational Improvements

Develop Board Goals and Objectives

Integrate Institutional Strategic Plans

Develop Annual Tactical Plan

Develop Budgets and Performance Criteria

Evaluate Performance

Revise Plan

13. STRATEGIC PLANNING RECOMMENDATIONS

The Arizona Board of Regents should express its vision of Arizona's future and the related role the Arizona universities, develop a formal strategic plan for the Arizona university system, and annually develop tactical, measurable statewide work programs and budgets related to the strategic plan.

- The first step in developing a strategic agenda for the Arizona Universities will require the Board to express its vision of Arizona's future and the appropriate role of the Board and the universities in that future, addressing such issues as technological change, demographical change and forecasted economic trends.
- The next step should involve the formulation of strategic Board level goals for the Arizona university system. Examples include, "Demonstrate equity and ensure access," or "Ensure continual improvement in quality of education".
- Once such goals are established, a set of intermediate, measurable, time-sequenced objectives should be developed to support the achievement of each goal. Examples of such objectives might include, "Double minority admissions by 1995," or "Reduce deferred maintenance backlog to zero by the year 2000".
- Individual long-range plans should then be developed by each university to reflect these objectives.
- After goals and objectives are identified, and university plans developed, strategic indices for measuring progress (e.g., admission targets, trends and ratios) should be developed for the system as a whole and for each university.

- The final step in the strategic planning process should involve the formulation of specific action strategies for the Arizona University System as a whole and for each of its principal components.
- After the strategic plan is published, the Board should meet annually in a "tactical planning retreat" to develop an annual program of work which supports the implementation of the systemwide and university strategic plans. Such a program of work should consist of a prioritized listing of projects for each component entity which the Board expects to be completed within the planning year. The program of work developed during this "tactical planning retreat" should be the first step in the development of all-funds budgets for the Universities and the Board for the planning year in question.
- Periodically, perhaps every three to five years, the long-range strategies should be evaluated and revised as appropriate. These strategies are likely to have significant organizational implications over time. After plans have been developed and implementation has begun, the Board should periodically revisit the steps outlined in the organizational improvements recommendations.

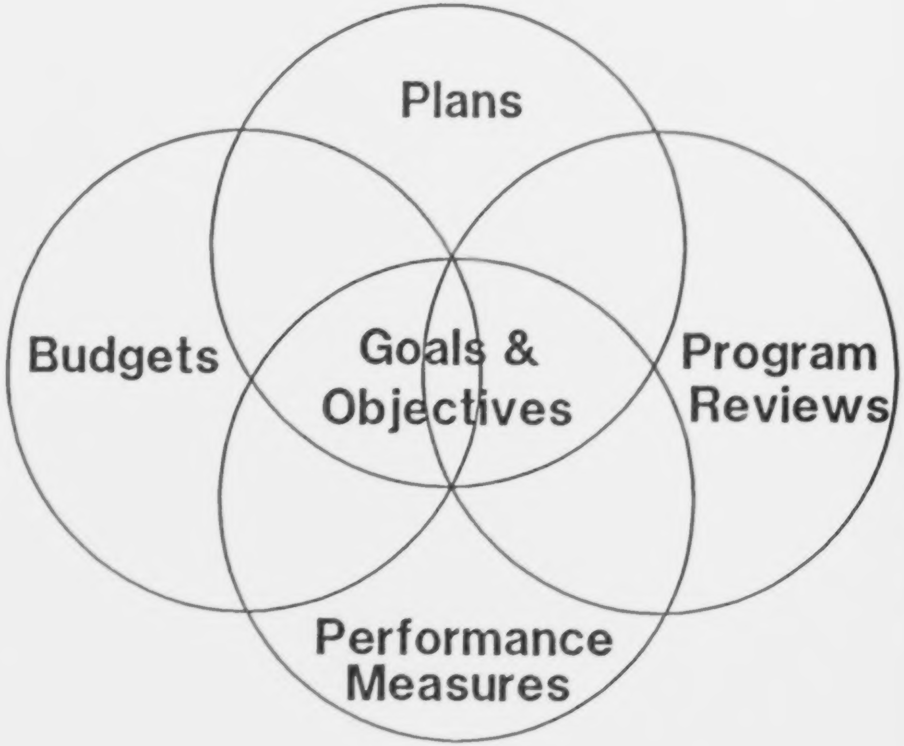
14. RECOMMENDATIONS ON SYSTEM LEVEL INFORMATION MANAGEMENT

The Arizona Board of Regents should develop state level information management and performance measurement capabilities to support strategic decision-making and to promote accountability.

- The Board can improve its effectiveness significantly by focusing its attention on critical decision areas, by routinely watching strategically important trends and key indicators (e.g., faculty salaries in comparison to peers), and by routinely monitoring performance in those areas that are crucially important to the success of its institutions.
- The Board should undertake a project to define and prioritize the characteristics of the specific decisions it must make, and to define a limited number of key relevant indicators to be produced by its staff which will serve to support these decision-making activities.
- Major demographic, financial and performance information should be made part of a limited set of information (e.g., student, staff, facility and program information) to be reported from each institution to the Board of Regents. The Board should work with the universities to determine report content and format and to eliminate inconsistencies in definition to allow uniform statewide reporting and to facilitate consolidation.
- Financial and performance reporting in particular should be improved. Specifically, the Board should receive better reports related to budget reallocations, the comparative costs of various programs, and long range financial plans.

1250

RECOMMENDED LINKAGES



Plans

Budgets

Goals & Objectives

Program Reviews

Performance Measures

- The Board should develop capabilities to demonstrate linkages between budget development and its strategic goals, the measurement of unit performance, and periodic program evaluations and reviews. Furthermore, the universities should develop capabilities to demonstrate to the Board, and the Board to the Legislature that budget proposals reflect the results of program review recommendations, that they are consistent and explicitly related to strategic goals and objectives, and that performance standards and measurements have been developed which are linked to the budget process and which satisfy university and Board standards for efficiency and effectiveness (e.g., one janitor per 20,000 square feet x one million square feet = budget for 50 janitors).

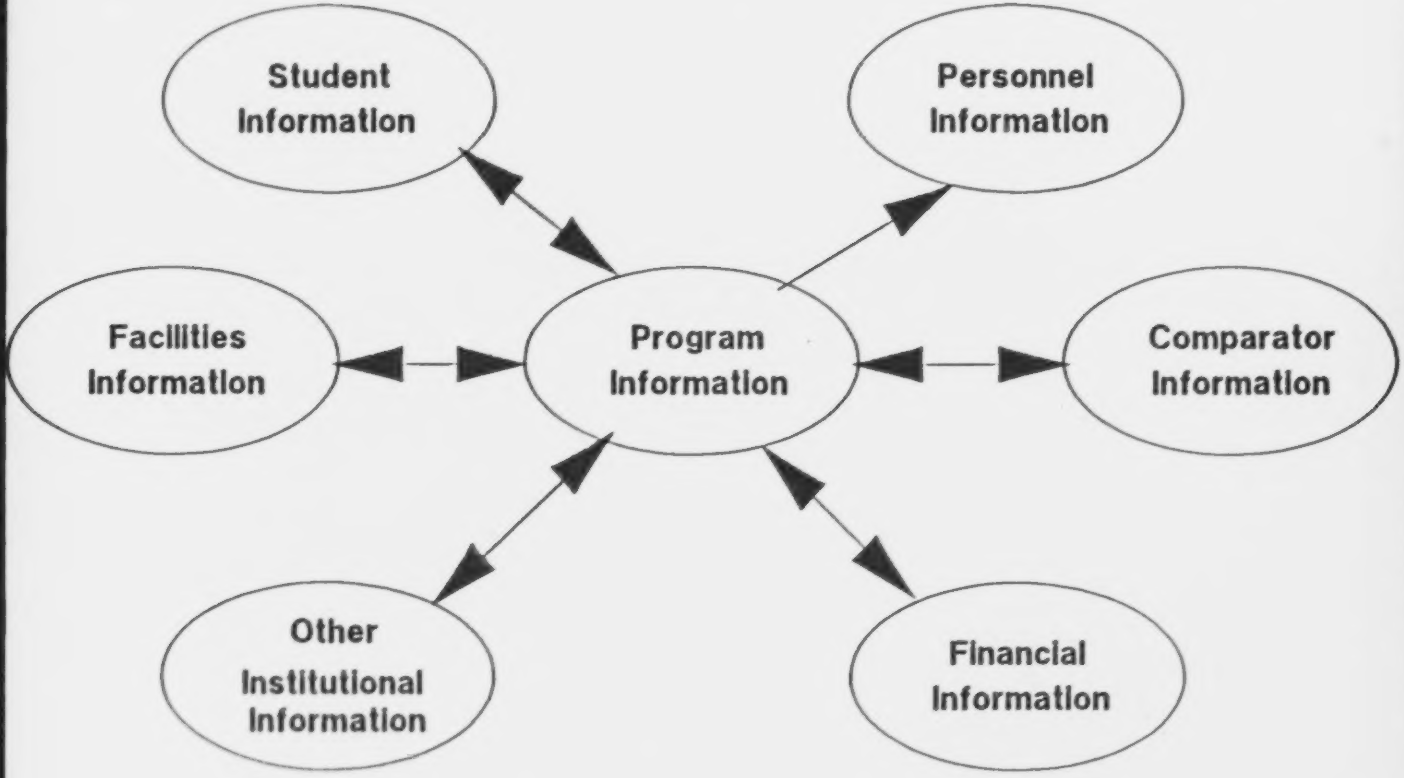
- The Arizona Board of Regents should prepare and disseminate an annual assessment of the status and performance of the Arizona Universities. This report should be distributed to both the Arizona Legislature and to each of the institutions annually.

- The Board Central Office should play the pivotal role in collecting and disseminating Board-level financial reports, performance indicators, and statewide decision support information. To play this role, the Central Office must significantly improve its information management capabilities.

The Board Central Office should develop information and research capabilities to facilitate "in house" comparative analysis of the Arizona university system and to minimize demands on the universities for such information and research.

- The Board should undertake a project to design and implement an automated information management system for the Central Office to increase accountability, improve coordination, reduce paperwork and streamline decision-making processes at both the Board and university level.

Components of a Decision Support Information System
for
The Arizona Board of Regents



Student Information

Personnel Information

Facilities Information

Program Information

Comparator Information

Other Institutional Information

Financial Information

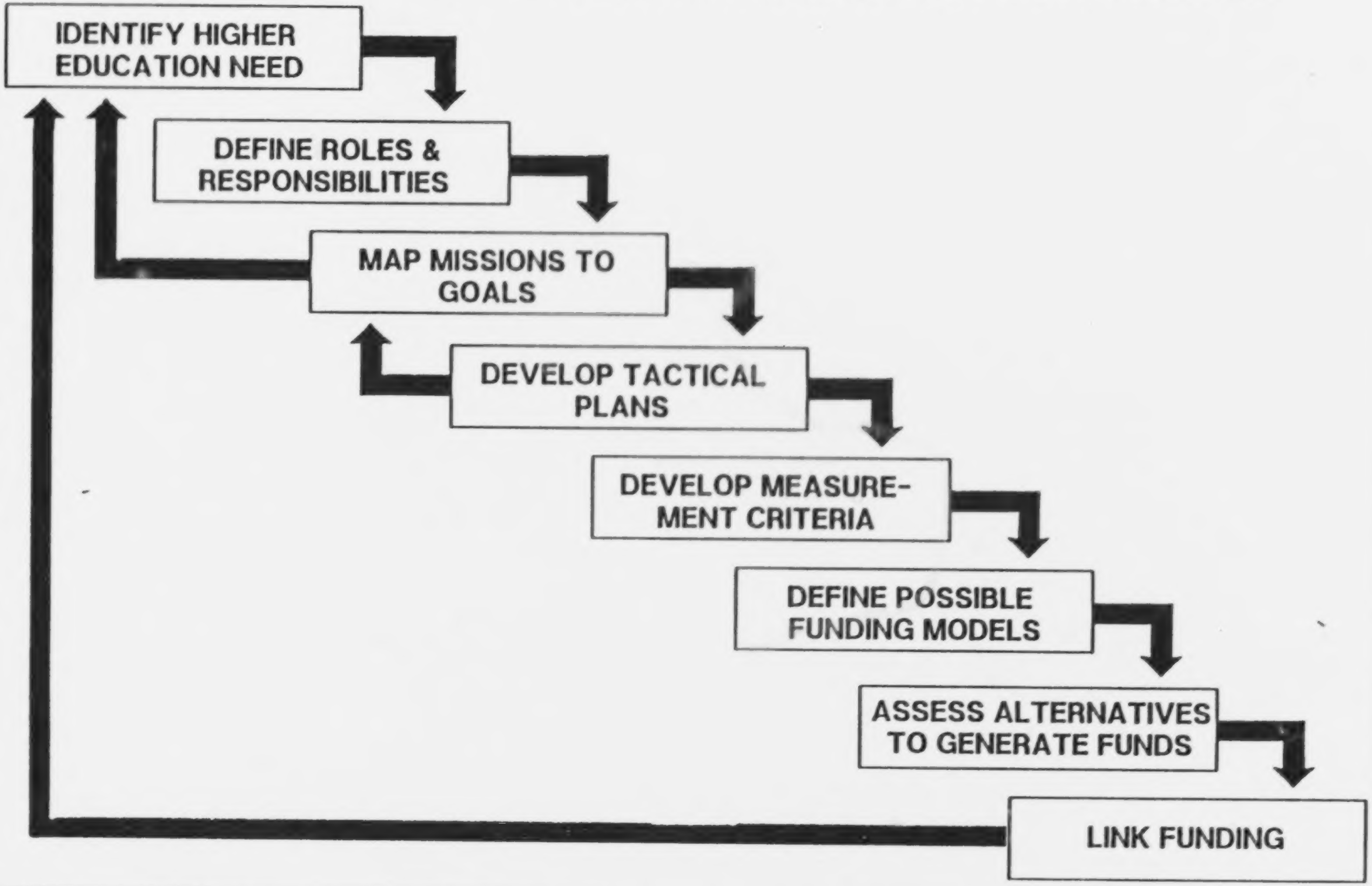
- The system should require the universities to produce and submit standardized data files in a format specified by the Board, but should not specify the systems by which the universities produce such files. We see no need for Board level "on-line" access to university information systems.

- The system should be designed to be updated with new university submissions only infrequently, and should be designed in collaboration with the universities to ensure that unreasonably expensive reporting requirements are not built in.

- The Board Central Office should establish an office library to support institutional and historical research related to the Arizona universities and other institutions of higher and public education and state government.

- The Board Central Office should employ a Chief Information Officer responsible for implementing and maintaining the system and the library described above, as well as providing guidance and advice to both the Board and the universities in the areas of system-level data management, data administration, and management information system implementation.

STATE OF ARIZONA
DEVELOPMENT OF FUNDING FRAMEWORK FOR CHANGE



IDENTIFY HIGHER EDUCATION NEED

DEFINE ROLES & RESPONSIBILITIES

MAP MISSIONS TO GOALS

DEVELOP TACTICAL PLANS

DEVELOP MEASUREMENT CRITERIA

DEFINE POSSIBLE FUNDING MODELS

ASSESS ALTERNATIVES TO GENERATE FUNDS

LINK FUNDING

15. FUNDING AND APPROPRIATIONS RECOMMENDATIONS

The current funding process should not be changed until a clear state agenda for university education in Arizona has been developed.

- We do not recommend major changes to the present funding approach because we believe any funding mechanism must be an integral component of statewide goals and plans. Absent those goals and plans in Arizona, modifications to the existing funding mechanism would be rash. However, this recommendation should not be construed as an endorsement of Arizona's existing approach to funding its universities.
- Arizona's funding process must be thoroughly reevaluated after the state's goals and aspirations are defined.
  - Based on an environmental assessment, clearly articulated objectives and priorities should be established on a statewide basis, as outlined previously.
  - Given these objectives and priorities, the current system for funding the universities must be assessed in terms of its ability to achieve them.
  - Gaps in the current process must be identified and the essential requirements of a modified funding system must be developed.
  - Alternative revenue sources such as private giving or resource endowments must be identified and analyzed.
  - Finally, given all of the above, the funding process must be redesigned or modified to support state and institutional goals.

1256

The following gaps and weaknesses in the current funding process should be addressed.

- In light of recent budget cuts and greater competition for resources, the regents and the legislature must promote stability by providing stronger buffers against either enrollment declines or "automatic" growth. Base budgets should become more predictable to discourage short-term thinking and to minimize mid-year adjustments.
- The funding of institutional growth should be rationalized based on cost and program requirements. Funding formulae should move beyond "22:1" to give consideration to incremental support staff, differences in academic program characteristics or student levels, and required equipment.
- The allocation of decision packages, bonding authority and capital outlay funding should be in support of statewide and institutional objectives rather than the traditional 2:2:1 approach. Statewide priorities should take preference over the traditional "equity" approach to funding the three universities. At a minimum, all or a portion of the decision package dollars should be placed in a competitive pool as incentive funds to each institution in light of statewide priorities.
- Improved buffers should be established to protect the universities from planned and unplanned enrollment declines. An institution planning an enrollment cap in the interest of educational quality or campus life should not be made to suffer automatic diminution in faculty.
- In the interest of stability and fairness, the Regents should examine their philosophy regarding tuition for out-of-state students. Other states, such as Colorado, have not experienced declines when "full cost" out-of-state tuitions were established.

PERFORMANCE STANDARDS

System Goals	Ensure Up To Date Physical Plant
System Strategic Objectives	Reduce Deferred Maintenance to Zero Statewide by 2000
Institutional Tactical Objectives	Complete $1 Mill[illegible]n Deferred Maintenance This Year
Departmental Objectives	Complete Deferred Repair of Library Roof by June 30, On or Under Budget
Unit Objectives	Complete Library Roofing Preparation by May 15
Position Standards	Complete Tasks Such As X, Y and Z On Time
Individual Objectives	Complete Task X by May 15

The current level of institutional autonomy is one of the major strengths of the Arizona university system and must be encouraged and preserved in any funding approach.

To decrease overall reliance on state funding, incentive programs to increase private giving (e.g., state matching) should be created and implemented. Programs which encourage the universities to increase and retain funds should also be developed. Examples include: allowing unused fund balances to be carried forward to the next year without an offset and establishing more flexible tuition pricing practices.

Greater accountability measures should be developed through performance monitoring and reporting.

If the institutions are to have freedom and flexibility in managing their operations, they should expect to be held accountable for the uses of those funds and their performance in executing an implicit "public contract" with the legislature and Board. Accountability through performance measures should become an integral part of the funding process in Arizona. The system and its institutions must be able to demonstrate the results of their efforts against defined goals. Such systematic assessment activities can aid in the measurement of investment return and goal achievement.

16. RECOMMENDATIONS FOR UNIVERSITY INFORMATION SYSTEMS MANAGEMENT

Information systems at each university should be planned more strategically and implemented more carefully. Each university should increase its emphasis on end-user computing, data administration, and the control of system maintenance.

- Each university should develop a strategic information systems plan to guide the long-range development, implementation, integration, and migration of information systems which are in concert with each university's overall strategic direction.
- Arizona State University and the University of Arizona should conduct independent reviews of major systems currently under development to assess adherence with original plans and schedules and to control risks. Such a review should be conducted for and report to each university's President's Council. The objective of the review should be to provide a quantifiable measure of comfort or assurance to university executives that these systems will be able to be implemented on time and that they will meet expectations. We recommend the senior university executives engage an independent third party to conduct such an implementation review.
- Northern Arizona University should carefully analyze in-house development versus package purchase options and should seek to apply the lessons learned by Arizona State University and University of Arizona and should employ a structured systems development methodology in the implementation of its new financial systems.
- Each university should organize or upgrade end-user computing departments to assist in and control the acquisition, use, security and training in the area of personal computers.

1260

- Each university should develop a data administration function and data administration policies to manage and integrate the information needs of the universities. The partial commitments to data administration that have already been made at Northern Arizona University and Arizona State University should be strengthened.

- Each university should implement change control, cost tracking, and maintenance monitoring systems to identify application systems which may be candidates for replacement.

17. HUMAN RESOURCES MANAGEMENT RECOMMENDATIONS

Human resources management should be governed by a comprehensive, Board level philosophy and strategy executed consistently across all employee groups. Additionally, the Board and universities should improve their approach to nonclassified compensation and classification, position control, and employee benefits.

- The Board of Regents should develop an overall human resources philosophy for the Arizona University System to reduce risks and improve its focus on its most important resource. We recommend the Board expand the focus of its current activities in human resource management and develop an overall human resources philosophy related to all employee groups and the full spectrum of human resources management.

- The scope of compensation and classification systems currently being developed for classified employees should be expanded to include administrative and nonfaculty professional personnel. The compensation strategy should encompass a planned "competitive posture" for base salaries relative to other organizations in the same labor market, the labor markets to be used as a basis for comparison, and the relative emphasis to be placed on cash compensation versus employee benefits.

- Each university should adopt a policy for recruiting which would centralize responsibility for the recruiting of most positions in the personnel departments, to reduce duplication of effort, minimize advertising costs, and yield a better applicant base.

- The Board and each University should work to improve manpower planning and position control capabilities to provide a framework for staff planning, human resource development programs, budgetary controls and monitoring, and recruitment initiation functions. The Board should be able to demonstrate each university's human resource requirements and evaluate the overall position mix within the organizational structure.
- The Universities should seek to reduce personnel paperwork and streamline personnel processes. Specific recommendations are outlined in the full report.
- The Board of Regents should encourage the State Department of Administration to evaluate self-insurance options for employee health and dental plans. Specifically, a feasibility study should be conducted to determine what economies can be achieved from self-insuring the medical and dental plans. As a part of this study, an independent audit of health and dental claims paid by the current claims processor should be conducted, as should a review to assess the risk of adverse selection of benefit programs.
- An assessment should be made of the effectiveness of current cost containment programs including a review of the administration requirements and costs of such programs relative to the impact on the cost and treatment of medical care.
- The benefits recommendations above apply not only to the Arizona Board of Regents but to the State Department of Administration in its role as "benefits manager" for all state employees.
- The Board should review its retirement and savings plan policies in light of federal discrimination testing requirements.

- Northern Arizona University should accelerate the planned implementation of a new human resources information system. NAU plans to select and implement such a system in 1990. We recommend the development of this system be initiated as soon as possible, ideally during 1989.
- The Board Central Office should employ an experienced human resources management professional to assist in the implementation of these recommendations and other system level human resources activities.

18. FACILITIES AND PHYSICAL RESOURCES MANAGEMENT RECOMMENDATIONS

Our recommendations in the area of physical resources and facilities involve performance measures and standards, improvements in cost and timeliness, and other specific productivity suggestions.

- The Board and universities should significantly improve their planning and analysis capabilities related to facility, grounds, and utility condition. The Board should conduct an initial systemwide independent facilities and utilities audit to objectively assess the condition of each university's building, grounds and utility support systems. Based on the data collected in the initial audit, adequate funding levels for "building renewal" should be objectively determined and sought for the Legislature.

- Ways should be found to demonstrate and assure that physical resources costs are as competitive as reasonably possible with the private sector. Procurement offices should allow user departments to receive competitive proposals from both outside contractors and the university physical resources departments using plans and specifications prepared by users. The City of Phoenix has successfully implemented such a program, one of the first of its kind in the U.S., with estimated cost savings and cost avoidance of $16 million.

- The $10,000 threshold for competitive bidding of building renovations should be increased to allow physical resource management the flexibility of completing jobs in-house or contracting vendors depending on deadlines and availability of resources. This will require Legislative action.

1265

- University physical resources departments must resolve perceptions of tardiness and unreasonable cost on the part of the faculty and research communities. For example, more consistent and better understood chargeback policies should be developed, and the universities should explore the use of standard prices for common projects, expanded use of outside contractors for specialized services, and the implementation of "handyman" programs for small problems and quick response.

- Performance measurement in physical resources departments should include the accumulation and analysis of individual building conditions including information about maintenance and repair costs per square foot by building and correlation or repairs with specific types of problems, projects, or building conditions.

- The universities should seek out and reward productivity in facilities management operations through targeted incentive award programs and recognition of excellent performance.

- More comprehensive backlog reporting systems should be designed and implemented at each university. Labor and material requirements should be estimated on all requisitions before they are forwarded to trade shops to enable better planning, scheduling and backlog management.

- Information systems should be developed or procured at all three universities to track work requisitions, their stage of completion, estimates to complete, actual completions, and variances.

- Each University's leadership should periodically establish and monitor priorities among the various "jobs" that originate in the teaching and research component of the institution.

- Physical resource department relationships with academic units should be strengthened through periodic meetings.
- Classroom scheduling functions at each of the universities should be automated and coordinated with the space management function.

19. PROCUREMENT RECOMMENDATIONS

The Arizona universities should develop systems and functions to improve overall coordination and control of the entire procurements process.

- Each of the universities should appoint a senior executive to oversee the overall procurement process. This individual should have line authority over some components of the procurement process (e.g., purchasing and contracting) and staff authority over the entire range of procurement functions.
- Each university should define and establish information requirements and develop reporting systems to support, monitor and control the procurement process as a whole. The three universities should work together to define these requirements for an automated procurement system, and if possible, install similar systems at all three universities.
- Each university should strive to improve buyer/customer relationships and university/ vendor relations.

20. IMPLEMENTATION RECOMMENDATIONS

The following recommendations cover implementation timing and other considerations. There are several essential conditions for the implementation of these recommendations contained in the preceding pages.

Most of our recommendations are interdependent and follow a logical implementation sequence.

- Development of a strategic agenda will be difficult or impossible if organizational improvements are not addressed.
- Definition of Board strategic information requirements presumes that the Board has developed a strategy.
- Changes in the funding process should not occur before the articulation of a strategic plan.
- Many of our specific resource management recommendations relate to recognizing the strategic importance of resource planning and management in the context of long-range statewide and institutional goals.

The Arizona Board of Regents must become a strong advocate for implementing these recommendations.

- The Board has the authority and resources to cause these recommendations to be implemented. It must also have the will to do so.
- The Board has the responsibility to implement these recommendations.
- The Board has a vested interest in taking the initiative in implementing these recommendations, rather than waiting for the Arizona Legislature to do so.

Several essential conditions must set the stage for implementation of our organization and funding recommendations.

- Each of the participants in the process must approach the subject at hand with an open mind and an understanding that change is not a negative phenomenon in and of itself.
- There must be a willingness to recognize that the current decision-making and funding processes may not be the best approach and may not be promoting all of the State's educational needs.
- Likewise, there must be recognition and acceptance of the fact that Arizona taxpayers invest heavily in higher education and have a vested interest in the "return" on that investment in financial, operational and academic terms.
- Participants should understand that planning and implementing organizational and funding changes will be a participatory, collaborative and iterative process.

These recommendations will take time, labor and money to implement.

- The Board should plan to spend several years spearheading these recommendations to make them successful.
- The resources necessary to implement these changes must accompany mandated changes at the institutions.
- Our most important recommendations, relating to organization and planning, will primarily require an investment of "sweat equity" and time. Their out of pocket costs will be negligible relative to the potential benefits.

Implementation of these recommendations should be phased-in over time.

Implementing the recommendations contained in this report will not be easy, free, or accomplished overnight. Assuming adequate commitments of time and resources, the following sequence of implementation is recommended.

We recommend implementation of the following system level activities in 1988.

- Organizational improvements should receive the Board's highest immediate priority. Every effort should be made to complete the recommended "organizational design" project by the end of calendar year 1988.
- The Board should also implement the strategic planning recommendations contained in this report during 1988, and plan to complete and publish a strategic plan during 1989.
- Other Board-level activities which should be completed during 1988 include:
    - Review Board personnel policies in light of discrimination testing requirements for Section 125 retirement plans. (This is needed immediately to reduce the risk of inadvertent noncompliance.)
    - Complete conceptual design and prototyping of a Board information system.
    - Develop a comprehensive system-level human resources management strategy.
    - Initiate a project to develop a compensation and classification system for administrative and non-faculty professional employees.
    - Hire a chief information officer and an experienced human resources management professional.

- The Board should conduct the recommended independent facility/utility audits of its three universities as soon as funding allows, and if possible, before the end of 1988.

University implementation priorities for 1988 should include the following activities:

- The University of Arizona and Arizona State University should each conduct independent reviews of the implementation status of their core financial systems. These systems should be fully implemented and operational by the end of 1988.
- All three universities should initiate and, if possible, complete projects to develop strategic information systems plans before the end of 1988.
- Northern Arizona University should initiate procurement or development of core financial systems before the end of 1988, if funding will allow.

1272

The following recommendations should be undertaken in 1989.

- In 1989, the Board should complete its strategic plan and reevaluate the state funding and appropriations process in light of the plan.
- The Board should also complete the following activities during 1989:
  - Develop its first statewide "program of work", focusing on the 1991-92 budget year
  - Fully implement a Central Office information system

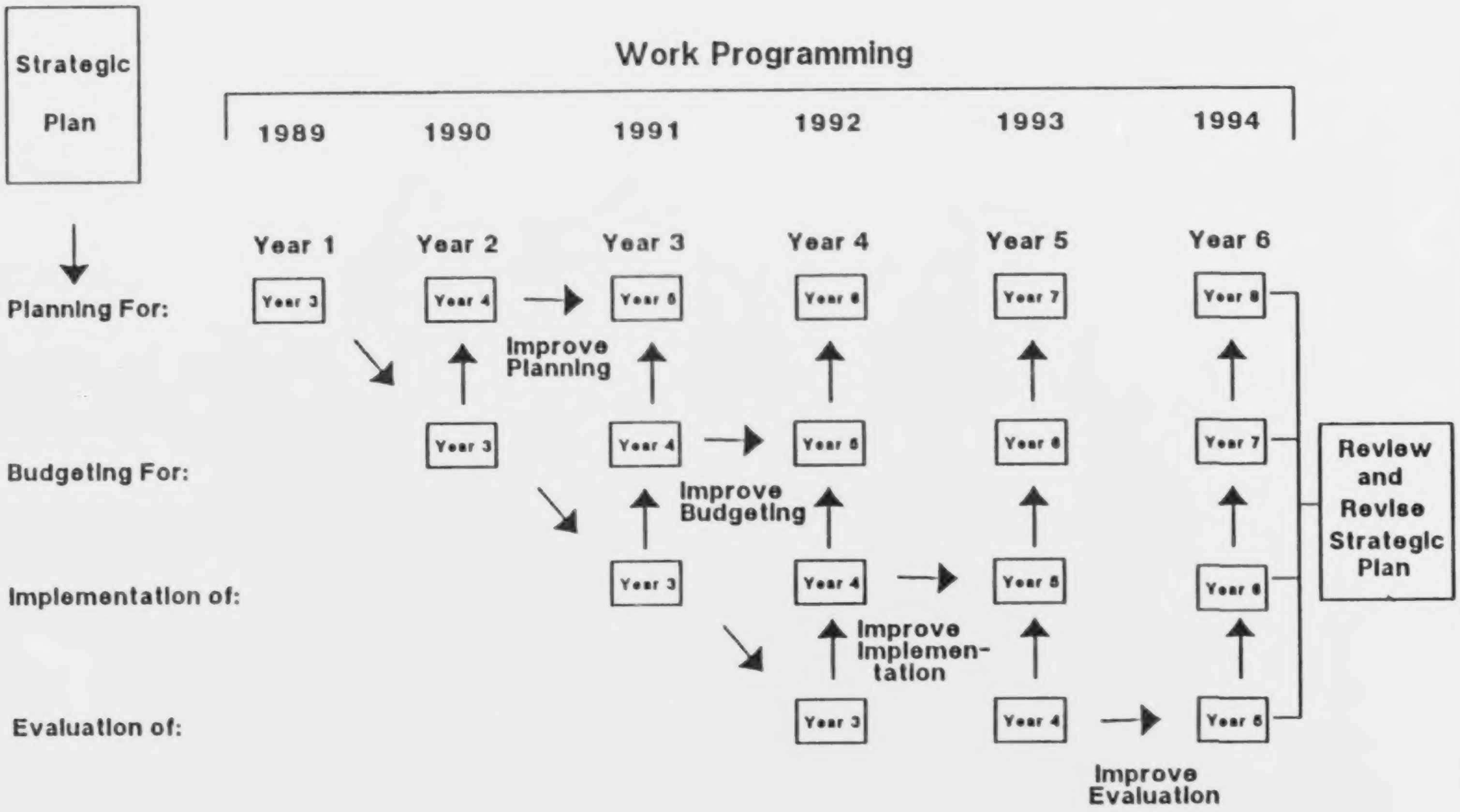
  - .. Develop new performance/accountability measures and implement new reporting procedures in conjunction with Central Office information systems
  - .. Work with the State Department of Administration to implement recommendations related to employee health and dental plans.

- Northern Arizona University should complete procurement or development of core financial systems and initiate procurement or development of a human resources management system during 1989.
- All three universities should collaborate in the definition of requirements and implementation of purchasing information systems.
- All three universities should continue to implement the other specific productivity improvement, performance measurement, and systems development recommendations contained in our report as resources allow during 1989 and thereafter.

Our recommendations for implementation in 1990 include the following tasks.

- In 1990, the Board should work with the Legislature in an effort to recraft the state funding process to explicitly promote the Board's strategic plan and program of work. The Board and the universities should develop their "all-funds" budgets for FY 1991-92 to reflect the strategic plan and program of work developed in 1989.
- The Board should develop its second program of work, focusing on the 1992-93 budget year during 1990. The Board should begin laying the groundwork for independent program reviews and performance appraisals to be conducted as part of the 1991-92 work program.
- If possible, Northern Arizona University's core financial and personnel systems should be accelerated to be fully implemented and operational by the end of 1990.

Strategic Planning and Implementation Cycle



Strategic Plan

Work Programming

	1989	1990	1991	1992	1993	1994
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Planning For:	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Budgeting For:		Year 3	Year 4	Year 5	Year 6	Year 7
Implementation of:			Year 3	Year 4	Year 5	Year 6
Evaluation of:				Year 3	Year 4	Year 5

Improve Planning

Improve Budgeting

Improve Implementation

Improve Evaluation

Review and Revise Strategic Plan

SURVEY OF ADMINISTRATIVE SERVICE OPERATIONS AT THE UNIVERSITY OF ARIZONA, ARIZONA STATE UNIVERSITY, AND NORTHERN ARIZONA UNIVERSITY

GEORGE H. DAVIS

SUMMARY

The EEC Task Force Staff conducted a survey of faculty, staff and student perceptions of the quality, importance and change in quality of the service provided by selected academic and nonacademic administrative operations at each of three Arizona universities. Distribution of the survey form was based on random sampling of populations of faculty, staff and students, grouped according to gender and class or rank. A total of 875 faculty/staff questionnaires (57% return) and 524 student questionnaires (35% return) were received. The chief purpose of the survey was to provide perspectives that would aid Coopers & Lybrand in their selection of administrative service operations that would receive closer review in their management audit. Furthermore, it was felt that the survey data would be of value to the management of each of the three universities.

The survey data are informative but are subject to misinterpretation if limitations are not clearly understood. There are no normative data that permit us to judge what in fact is a good score for a given unit, such as library services, as opposed to another unit, such as parking, and thus direct cross comparisons of quality ratings are suspect. Although most respondents evaluated the importance of a given unit in the way intended (i.e., how important is this service to you as you carry out your work as a faculty or staff member or student?), some appear to have rated the importance of the service or operation to the university. The differences between grand mean scores for all of the administrative service operations, viewed collectively for each of the three Arizona universities, are very small. Although the grand means are best estimates, the differences between scores are not meaningful. Thus it is inappropriate to use the grand means as a basis for ranking the three universities in terms of quality of services that they provide.

Finally, certain nonacademic administrative services are not used by all faculty,yielding very low numbers of

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George H. Davis joined the faculty of the University of Arizona's Department of Geosciences in 1970, following PhD studies at the University of Michigan. His research and teaching have centered on the nature and origin of structures in mountain belts. Davis' undergraduate textbook, Structural Geology of Rocks in Regions, has extended his reach as a teacher to students outside of Arizona, in other parts of the country and the world. He also served as Head of the Department of Geosciences and serves as Vice Provost for Academic Affairs at UA.

faculty evaluations received for such services. Similarly, certain academic administrative services are not used by all staff, yielding very low numbers of staff evaluations received for these services.

Certain major observations can be drawn. At all three universities, faculty, staff and students perceive the overall services to be midway between fair and good in quality, improving slightly. (The scale of choices for evaluation of quality ranged from very poor to very good). At all three universities, faculty, staff and students perceive the importance of the services, overall, to be high. (The scale of choices for evaluation of the importance of the services ranged from very low to very high).

Of the 25 administrative service operations surveyed, faculty at the University of Arizona ranked the quality of service of 13 operations as good and 12 as fair; and staff ranked the quality of service of 15 operations as good and 10 as fair. Of the 18 administrative service operations surveyed, students at the University of Arizona ranked the quality of service of 11 operations as good, 6 as fair and 1 (parking) as poor.

Of the 25 administrative service operations surveyed, faculty at Arizona State University ranked the quality of service of 13 administrative service operations as good, 10 as fair and 2 as poor (repair/remodeling and risk management;--caution--low numbers of ratings); and staff ranked the quality of service of 19 operations as good and 6 as fair. Of the 18 administrative service operations surveyed, students at Arizona State University ranked the quality of service of 11 operations as good, 6 as fair and 1 (parking) as poor.

Of the 25 administrative service operations surveyed, faculty at Northern Arizona University ranked the quality of service of 4 administrative service operations as good and 21 as fair; staff ranked the quality of service of 17 administrative service operations as good and 8 as fair. Of the 18 administrative service operations surveyed, students at Northern Arizona University ranked the quality of service of 11 operations as good, 6 as fair and 1 (parking) as poor.

Faculty and students at all three universities agreed that the single most important administrative service operation is the library, the only operation that received, overall, a very high importance rating. No operation was considered by faculty, staff or students to be of low or very low overall importance.

The chief value of the detailed data that will be passed on to the universities may lie in helping management to more confidently identify those administrative service operations which appear to be functioning well; to identify those that are functioning adequately; and to identify those that represent opportunities for improvement. The survey results may also permit management to evaluate whether the distribution of resources and priorities of emphasis are in line with the importance of these administrative service operations as viewed by faculty, staff and students.

It is specifically recommended that this survey be implemented at three year intervals. These initial survey results would then provide a benchmark to help evaluate the impact of administrative decisions related to the distribution of resources, organizational changes, leadership changes and the like. Data from assessments gathered at three-year intervals could be used to map trends, such as changes in perception of quality through time.

INTRODUCTION

As part of the evaluation of management efficiency of the three Arizona Universities, the Task Force staff for the study on Efficiency, Excellence, and Competitiveness (EEC) conducted an assessment of faculty, staff, and student opinions regarding the quality, importance, and change in quality of services provided by university administrative service operations. Opinions were gathered by means of a questionnaire distributed to randomly selected faculty, staff, and students.

Results provide

(1) comparative statistical information summarizing user perceptions of each of the major administrative service operations,

(2) an integrated view of the level of overall satisfaction with the administrative service operations on each campus, and

(3) a basis for measuring future changes in the quality of service provided by the administrative operations.

BACKGROUND

When it became understood that the firm of Coopers & Lybrand would be given only several months within which to carry out its field work in the evaluation of the management efficiency of the three Arizona universities, the EEC Task Force staff was asked to carry out certain preparatory steps that would enable the firm to begin more quickly and to accomplish more than what might otherwise be possible. Among these was conducting a survey of faculty, staff, and student perceptions of the quality, importance, and change in quality of the main administrative service operations. It was felt that the results of such a survey could be used by Coopers & Lybrand to help them in their selection of the administrative service operations that would receive closer review.

Furthermore, it was felt that survey results would be of significant internal use to the three universities.

In the absence of readily available output-related measures that could be used to quickly but validly assess overall quality of service provided by each administrative service operation at each university, it was necessary to use a substitute methodology: to infer quality on the basis of user perceptions of the quality. Similarly, assessments of the importance and change in quality of the services provided by the administrative service operations had to be inferred from user perceptions.

Two survey instruments (questionnaires), one for faculty and staff, the other for students, were prepared with the help and advice of the University of Arizona's Center for the Study of Higher Education (Appendix A). Each questionnaire listed the names of major administrative service operations relevant to the mission of faculty/staff and students, respectively. For each of the listed administrative service operations, the respondents, whether faculty, staff, or students, were asked the following:

1) How often do you use this service? Choices: frequently, sometimes, never.

2) Rate the quality of the service. Choices: very poor, poor, fair, good, very good.

3) How has the quality changed? Choices: much worse, worse, same, better, much better.

4) Rate the importance of the service. Choices: very low, low, average, high, very high.

The questionnaire was mailed to individuals identified through random sampling of "stratified" populations of faculty, staff, and students.

Full-time faculty on each campus were grouped according to gender and rank (full professor, associate professor, assistant professor, other). Full-time staff were grouped according to gender and pay grade classification. Full-time students were grouped according to gender and class (first-semester freshmen, other freshmen, sophomores, juniors, seniors, graduate students).

For faculty and staff, a random sample was drawn, distributed proportionately across the stratified subpopulations. For students, the names of 500 individuals were drawn randomly, again distributed proportionately across the stratified subpopulations. The number of questionnaires distributed, and the number and percentage of questionnaires returned, by institution and by category, were as follows:

	UA	ASU	NAU
Faculty surveys distributed:	228	187	204
Faculty surveys returned:	116	98	132
% Faculty surveys returned:	51%	52%	65%
Staff surveys distributed:	466	279	214
Staff surveys returned:	208	197	124
% Staff surveys returned:	45%	71%	58%
Student surveys distributed:	500	500	500
Student surveys returned:	155	171	198
% Student surveys returned:	31%	34%	40%

A total of 875 faculty/staff questionnaires and 524 student questionnaires were received from the three Arizona universities. Returns were approximately 57% for faculty and staff, and 35% for students. The stringent time table within which the survey was conducted did not permit the follow-up work that would have been required to increase the percentage return to the 70% to 80% level normally required to rule out bias and to assure validity.

DATA

Data summary sheets were prepared for each administrative service operation for each university. Bar graphs were generated to present the numerical responses for each university in a visually meaningful way. Average (mean) ratings for the categories quality, importance, and change in quality were computed for each operation, for each university, and for each survey group.
For each university, and for each survey group, the mean scores for each administrative service operation were used to rank the operations in order of quality, importance, and change in quality. Based on these rankings, graphs were developed which, for each university and survey group, show the ranked distribution of administrative operations in two ways: quality vs importance; quality vs change in quality.

Graphs were prepared that show the full range of mean ratings of quality and importance for the administrative service operations for each university by survey group; and the full range of mean ratings of quality and change in quality for the administrative service operations for each university by survey group.

Furthermore, graphs were constructed that show the individual raw scores of mean quality and importance for each administrative service operations for each university by survey group.

LIMITATIONS

The survey results reported here have value, but they also are subject to misinterpretation.

Misinterpretation could result from failure to understand inherent limitations, of the following type:

1. Although faculty, staff, and student perceptions of the quality of service provided by each administrative service operation is evaluated according to a 1.0 to 5.0 scale (very poor to very good), there are no normative data that permit us to judge what in fact is a good score for the bookstore, as opposed to custodial services; for grounds maintenance, as opposed to the office of the academic vice president; for food services, as opposed to parking or academic computing. Thus direct cross comparisons of quality ratings, one unit to another, become suspect. For example, it is probably much more difficult to win high quality marks from faculty for purchasing and parking than it is to win high marks for library services and sponsored projects. Units like parking, security/police, and purchasing are engaged in enforcement activities, and thus are more likely to have a higher level of difficulty in generating positive, favorable perceptions.

   A similar limitation characterizes student evaluations of teaching, wherein it is more difficult to win high quality marks from students enrolled in large, compulsory freshman mathematics classes than it is to win high marks in small elective graduate specialty courses. Without normative data, we cannot make the kinds of corrections in this survey of the type that for cross comparison purposes have become standard in the interpretation of student evaluations of teaching.

2. Although faculty, staff, and student perceptions of the importance of the service provided by each administrative service operation is evaluated on a 1.0 to 5.0 scale (very low to very high), there is some ambiguity regarding the basis on which importance was judged. Most respondents, we believe, evaluated importance in the manner intended: namely, the practical importance of the service provided by the unit to the user in carrying out his or her responsibilities. However some respondents evaluated importance on a different basis: namely, how important is this administrative operation and/or service to the successful functioning of a university? It makes a significant difference whether the former or latter perspective guides the rating of importance of the administrative service operations:a unit such as planning/construction or grounds maintenance may not have had

direct practical importance to a given respondent, yielding a "low importance" rating. Yet this same respondent, if asked to evaluate the importance of planning/ construction or grounds maintenance to the university overall, might rate at the level of "high importance". Similarly, a department head, dean, or vice president might rate the importance of the services provided by repair and remodeling, or risk management, much higher than these services would be rated by a faculty in the humanities. Overall we urge that no good or bad connotations should be attached to ratings of importance! The importance ratings are intended to give a sense of how essential the services are to faculty members in carrying out their teaching, research, and service; to staff carrying out their diverse supporting functions; and to students gaining an education.

3. Although faculty, staff, and student perceptions of the change in quality of the service provided by each administrative service operation is evaluated on a 1.0 to 5.0 scale (much worse to much better), we have not had time to examine the relationship between years of service at the (given) university and mean ratings. Among the faculty, some respondents are starting assistant professors, and others are senior full professors; among the students, some are starting freshmen, and others are seniors about to graduate. Various sets of respondents rated changes in quality of service on the basis of different durations of experience. Vice Presidents or directors who wish to explore for changes in quality in a careful and sensitive manner are urged to sort the raw data in ways to assure that respondents were active on campus during the time period(s) for which perceptions of changes in quality are being sought.

4. It cannot be overemphasized that the distinctions between grand mean scores for all of the administrative service operations, viewed collectively for each of the three Arizona universities, are very small. The grand means are best estimates, but the level of confidence that the differences may be meaningful is very low, given the calculated standard deviations. For example, the grand means for staff evaluations of the quality of services of all administrative service operations at ASU, UofA, and NAU are 3.56, 3.58, and 3.60, respectively (i.e., midway between fair and good). These tiny differences are not meaningful, and if additional evaluations had been returned it is possible that the relative positions of the three universities would be changed. Consequently, with respect to the use of all grand means, it is inappropriate to rank the three universities in overall quality, overall importance, and overall change in quality of administrative service operations.

5. Although the administrative service operations for each university have been rank-ordered in categories of perceptions of quality, importance, and change in quality, the differences in ratings on which differences in rank position are based are typically very small, representing only best estimates.

The actual level of confidence that the differences between ratings of operations close to the same ranked position may be significant are typically very low, given the calculated standard deviations. The fact that a given operation, like the telephone, might reside in the upper third of the ranked listing of quality of administrative service operations may be meaningful. But the differences between a ranking of #3 vs #7 may be so slight that if additional responses had been received the rank ordering might shift by several places or more.

6. There are certain nonacademic administrative service operations that are not used at all by some faculty.Consequently, the data reported here include certain administrative service operations for which the number of ratings awarded by faculty is small.We do not know, in these cases, whether the fraction of faculty responses received bears an accurate relationship to the percent of faculty that use the service at the given university.Because of this uncertainty, and because of the small sample sizes, faculty evaluations of service provided by the following units should be viewed very cautiously:for the University of Arizona, administrative computing, core accounting, and planning/construction; for Arizona State University, administrative computing, core accounting, grounds maintenance, planning/construction, and risk management; for Northern Arizona University, administrative computing, core accounting, planning/construction, and risk management.

   The same word of caution applies to the staff survey data.In this case there are certain academic operations that are not used at all by some staff. Staff evaluations of service provided by the following units, therefore, should be viewed very cautiously for the University of Arizona, the office of the academic vice president and academic computing; for Arizona State University, core accounting and risk management; for Northern Arizona University, planning/construction and sponsored projects.

7. Certain inferences cannot be derived from the survey results.For example, there can be no conclusions drawn as to the efficiency or competency of the management or staff of any of the administrative operations.In addition, it would be inappropriate to reach conclusions regarding whether or not the resources available to a given unit are adequate, inadequate, or excessive.

RESULTS

In light of these limitations, what dominant conclusions can be drawn from the survey results?There are a number.The first-order perceptions of quality, importance, and change in quality of the administrative service operations are as follows:

1. For all three universities, faculty, staff, and students perceive the quality of administrative service operations, viewed collectively, to be midway between fair and good.

2. For all three universities, faculty, staff, and students perceive the administrative service operations,

viewed collectively, as highly important to carrying out their work.

3. For all three universities, faculty, staff, and students perceive the quality of administrative service operations, viewed collectively, as staying about the same, improving slightly.

4. Of the 25 administrative service operations surveyed, faculty at The University of Arizona ranked the quality of 13 operations as good and 12 as fair.Of the 25 administrative service operations surveyed, staff at the University of Arizona ranked the quality of 15 operations as good and 10 as fair.Of the 18 administrative service operations surveyed, students at The University of Arizona ranked the quality of 11 operations as good, 6 as fair, and 1 (parking) as poor.

5. Of the 25 administrative service operations surveyed, faculty at Arizona State University ranked the quality of 13 administrative service operations as good, 10 as fair, and 2 (repair/remodeling and risk management) as poor.Of the 25 administrative service operations surveyed, staff a Arizona State University ranked the quality of 19 operations as good and 6 as fair.Of the 18 administrative service operations surveyed, students at Arizona State University ranked the quality of 11 operations as good, 6 as fair, and 1 (parking) as poor.

6. Of the 25 administrative service operations surveyed, faculty at Northern Arizona University ranked the quality of 4 administrative service operations as good and 21 as fair.Of the 25 administrative service operations surveyed, staff at Northern Arizona University ranked the quality of 17 administrative service operations as good and 8 as fair.Of the 18 administrative service operations surveyed, students at Northern Arizona University ranked the quality of 11 operations as good, 6 as fair, and 1 (parking) as poor.

7. Faculty and students at all three universities all agreed that only 1 of the 25 administrative service operations is of very high importance, and this was the library.No operations were considered by faculty, staff, or students to be of low or very low importance.

The graphs which portray the mean values of ratings for quality and importance of administrative service operations for each university show a reasonably dense or smooth continuous clustering of most of the values, but in all cases there are "outliers" that stand apart, and attention is drawn to these :

1. The faculty survey results for the University of Arizona reveal that, relative to the ratings for the other units, the library is rated higher both in quality and importance; that the garage/motorpool, grounds/maintenance, and bookstore are rated higher in quality; affirmative action is rated lower in importance; and parking, planning/construction, core accounting, repair and remodeling, and the graduate college are rated lower in quality.

2. The faculty survey results for Arizona State University reveal that, relative to the ratings for the other

units, the library is rated higher both in quality and importance; grounds/maintenance, payroll, and academic computing are rated high in quality; the garage/motorpool, repair/remodeling, and risk management are rated lower in importance; and risk management, repair/remodeling, purchasing, planning/construction, and parking are rated lower in quality.

3. The faculty survey results for Northern Arizona University reveal that, relative to the ratings for the other units, telephone is rated higher both in quality and importance; the library is rated higher in importance; garage/motorpool, payroll, and graduate college are rated higher in quality; risk management, stores, and affirmative action are rated lower in importance; and planning/construction, risk management, repair/remodeling, affirmative action, and parking are rated lower in quality.

4. The staff survey results for The University of Arizona reveal that, relative to the ratings for the other units, the library is rated higher both in quality and importance; payroll is rated higher in importance; bookstore, grounds/maintenance, printing, and payroll are rated higher in quality; grounds/maintenance and repair/remodeling are rated lower in importance; and parking is rated lower in quality.

5. The staff survey results for Arizona State University reveal that, relative to the ratings for the other units, the library is rated higher both in quality and importance; telephone, security/police, payroll, and mail are rated higher in importance; bookstore, grounds/maintenance, academic vice president's office, and telephone are rated higher in quality; risk management is rated lower in importance; and that parking, planning/construction, purchasing, and custodial services are rated lower in quality.

6. The staff survey results for Northern Arizona University reveal that, relative to the ratings for the other units, telephone, payroll, library, and mail service are rated higher in importance; academic vice president's office, printing, garage/motorpool, and bookstore are rated higher in quality; stores, repair/remodeling, and affirmative action are rated lower in importance; and graduate college, parking, and planning/construction are rated lower in quality.

7. The student survey results for the University of Arizona reveal that, relative to the ratings for the other units, the library is rated higher both in quality and importance; student health, financial aid office, and parking are rated higher in importance; bookstore is rated higher in quality; cultural events is rated lower in importance; and parking and financial aid office are rated lower in quality.

8. The student survey results for Arizona State University reveal that, relative to the ratings for the other units, the library is rated higher both in quality and importance; the bookstore is rated higher in quality; financial aid office, student health, and registration and records are rated higher in importance; fast copy

center is rated lower in importance; and parking is rated lower in quality.

9. The student survey results for Northern Arizona University reveal that, relative to the ratings for the other units, the library is rated higher in importance; student union, bookstore, and student health are rated higher in quality; cultural events and fast copy center are rated lower in importance; and parking is rated lower in quality.

A direct, linear relation tends to exist between rankings of quality on the one hand, and rankings of change in quality on the other.The rating of "change in quality" of each administrative service operation was perhaps the most subjective of the tasks asked of those surveyed.The linear relationship observed may be simply an artifact of bias, e.g., operations perceived to be of higher quality are, without necessarily sound basis, perceived to be getting better and better; while those thought to be of lesser quality are judged to be getting better at a slower pace, or are judged to be getting worse.Certain administrative service operations do not fit the linear relationship observed, and these seem important to identify:

1. Faculty at the University of Arizona rate academic computing as about average in quality, but well above average in rate of improvement.Although the academic vice president's office is rated above average in quality, the rate of improvement is relatively low.

2. Faculty at Arizona State University rate sponsored projects as slightly below average in quality, but well above average in rate of improvement.Although custodial services is rated as just slightly below average, its quality is perceived as getting worse.

3. Faculty at Northern Arizona University rate the office of the academic vice president, and payroll, as well above average, but the rate of improvement is relatively low.Although food services is rated as just slightly below average, its rate of improvement in quality is well above average.

4. Staff at the University of Arizona rate administrative computing as just slightly above average, but the rate of improvement is judged to be well above average.Although academic computing and the academic vice president's office are judged to be well below the average in quality, both operations are perceived to be well above average in improvement.

5. Staff at Arizona State University rate payroll and personnel as slightly above average in quality, but the rate of improvement is perceived as very low.Although food services is judged to be well below average in quality, its rate of improvement in quality is perceived to be very high.

6. Staff at Northern Arizona University rate the office of the academic vice president as very high in quality, but low in rate of improvement.Although food services is judged to be well below average in quality, its rate of improvement in quality is judged to be well above average.

7. Students at the University of Arizona rate telephone as well above average in quality, but slightly below

average in improvement. Computing is rated slightly below average in quality, but the highest of any operation in improvement. Although food services and residence halls are judged to be well below average in quality, their rate of improvement in quality is judged to be well above average.

8. Students at Arizona State University rate telephone as above average in quality, but with a change in quality that is getting worse. Payroll is judged to be average in quality, but getting worse. Computing is perceived to be slightly below average in quality, but well above average in improvement in quality. Although residence halls and food services are judged to be well below average in quality, their rate of improvement in quality is judged to be well above average.

9. Students at Northern Arizona University consider the dean of students office to be slightly below average in quality, but well below average in rate of improvement. Although food services is judged to be well below average in quality, its rate of improvement in quality is perceived to be very high.

Using mean ratings of quality, the administrative service operations for each university can be classified according to units rated higher in quality relative to other units, and units rated lower in quality relative to other units (See Appendix B).

RECOMMENDATIONS

The chief value of the results of this survey may lie in helping management to confidently identify those administrative service operations which appear to be functioning very well; to identify those that are functioning adequately; and to identify those that represent opportunities for improvement. The survey results may also permit management to evaluate whether the distribution of resources and the priorities of emphasis are in line with the importance of these administrative service operations as viewed by faculty, staff, students, and administrators. To facilitate the use of the data to bring about positive change, we have presented the survey results to the President's cabinets of each university, and are making all raw data, tables, charts, and graphs available to management at the three universities.

- It is specifically recommended that this same survey be implemented at three year intervals in order to track changes in quality through time. These initial survey results would then provide a benchmark to help evaluate the impact of administrative decisions related to distribution of resources, organizational changes, leadership changes, and the like. Data from assessments gathered at three-year intervals could be used to map trends, such as changes in perception of quality and importance of each administrative service operation.

APPENDIX A

FACULTY-STAFF-ADMINISTRATOR
ADMINISTRATIVE SERVICES QUESTIONNAIRE

	Frequently: More often than once every two months. ADMINISTRATIVE UNIT	How often do you use this service? Frequently | Sometimes | Never	Rate the quality of the service provided by this unit. Very Poor | Poor | Fair | Good | Very Good	Since you began using this service, how has its quality changed? Much Worse | Worse | Same | Better | Much Better	Rate the importance of the service provided by this unit. Very Low | Low | Average | High | Very High
1	ACADEMIC VP OFFICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
2	AFFIRMATIVE ACTION OFFICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
3	BOOKSTORE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
4	COMPUTING: ACADEMIC	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
5	COMPUTING: ADMINISTRATIVE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
6	CORE ACCOUNTING	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
7	CUSTODIAL SERVICES	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
8	FOOD SERVICES	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
9	GARAGE/MOTORPOOL	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
0	GRADUATE COLLEGE OFFICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
1	GROUNDS MAINTENANCE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
2	LIBRARY	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
3	MAIL SERVICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
4	PARKING	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
5	PAYROLL	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
6	PERSONNEL	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
7	PLANNING/ CONSTRUCTION	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
3	PRINTING/PUBS/ REPRODUCTIONS	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	PURCHASING	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	REPAIR/REMODELING SERVICES	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	RISK MANAGEMENT	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	SECURITY/POLICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	SPONSORED PROJECTS	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	STORES	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
	TELEPHONE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]

STUDENT
ADMINISTRATIVE SERVICES QUESTIONNAIRE

Frequently: More often than once every two months.	How often do you use this service?	Rate the quality of the service provided by this unit.	Since you began using this service, how has its quality changed?	Rate the importance of the service provided by this unit.
ADMINISTRATIVE UNIT	Frequently Sometimes Never	Very Poor Poor Fair Good Very Good	Much Worse Worse Same Better Much Better	Very Low Low Average High Very High
BOOKSTORE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
CULTURAL EVENTS	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
COMPUTING	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
DEAN OF STUDENTS OFFICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
FAST COPY CENTER	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
FINANCIAL AID OFFICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
FOOD SERVICES	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
GRADUATE COLLEGE OFFICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
LIBRARY	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
MAIL SERVICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
PARKING	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
PAYROLL	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
REGISTRATION/ RECORDS	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
RESIDENCE HALLS	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
SECURITY/POLICE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
STUDENT HEALTH	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
STUDENT UNION (GENERAL SERVICES)	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]
TELEPHONE	[f] [s] [n]	[vp] [p] [f] [g] [vg]	[mw] [w] [s] [b] [mb]	[vl] [l] [a] [h] [vh]

STATUTORY AND REGULATORY BARRIERS TO GREATER EFFICIENCIES IN THE ARIZONA UNIVERSITY SYSTEM

EDWARD JOHNSON

INTRODUCTION

In the spring of 1988, the Task Force staff requested that the Arizona universities submit reports outlining statutory and regulatory barriers to greater efficiency. This paper organizes their responses in narrative form under generic categories utilized by the Arizona Board of Regents Policy Manual. Each statute, regulation or policy is noted with commentary and recommendations, where offered. THE VIEWS EXPRESSED IN THIS PAPER ARE THOSE OF INDIVIDUAL INSTITUTIONS AND HAVE NOT BEEN REVIEWED OR ENDORSED BY THE TASK FORCE, THE UNIVERSITIES OR THE BOARD. The purpose of the paper is to provide a collective agenda for review and possible action by the Board of Regents.

ACADEMIC POLICIES

Board Policy Manual, Sections 2-101,102: Establishment of Admission Requirements/Uniform Undergraduate Admission Requirements

Historically, admission policies at the three universities have been statewide and uniform. Recently, some variance among institutions has been approved and continues to be under consideration.

A strong bias toward uniformity exists, which does not allow the universities to set and administer admission policies which are best suited to the goals and characteristics of their unique student bodies and institutional missions. The extensive review which must take place to effect institutional change in this area, therefore, reduces the ability to react quickly and progressively with programs that are targeted toward a given university's student population.

It has been suggested that the universities be allowed to set and administer admission policies independent of each other, based upon their institutional mission, future goals, and projected student population.

Board Policy Manual, Section 2-103 (A): Enrollment

Board policy states that non-resident head count enrollments in each university will not exceed 25% of the total head count enrollment.

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Arizona is only one of five states that has imposed a ceiling on the number of out-of-state students who can attend their public universities. It is important that each university admit the best qualified students. This is particularly true in graduate education as the State of Arizona does not yet have a sufficient population base from which to recruit qualified graduate students in the full spectrum of graduate programs. It is important to note that students usually establish their permanent residence where they complete their highest degree. Thus if the state universities recruit the very best graduate students, they will likely be retained as Arizona taxpayers and productive members of the skilled work force contributing to the state's economic development.

One university recommends that the Board apply the 25% ceiling on out-of-state enrollment to undergraduate enrollment only.

Board Policy Manual, Section 2-103(C): Enrollment

The policies for determining full-time equivalent (FTE) enrollments are so detailed that the amount of time expended to comply with these policies is counter- productive. Many exceptions must be made. However, the adjustments that are made result in a very small net change in the number reported; thus a largely accurate report could be provided with a minimal amount of effort. To prepare the FTE enrollment report now requires about 550 hours of regular time and 100 hours of overtime on the part of the Registrar's staff each semester. In addition to this, three Board of Regents' auditors work nearly two months in performing the audit. For example, according to UA, in the past ten years the difference between the UA's reported FTE enrollment and the final audited FTE enrollment has averaged 22.3 students.

The institution's official FTE enrollment should be its enrollment on the census date after being adjusted based on average recent historical data. The Regents' audit staff should perform an audit only periodically rather than every year.

BUSINESS AND FINANCE

ARS Chapter 23-901 et seq.: Workers Compensation

Arizona is one of the few states that handles claims rather than through a third party. The system is neither responsive nor effective: the system should be changed to rely on a third party to manage claims.

ARS 41-621 et seq.: University Risk Management Coverage

The Department of Administration and, in particular, the Tort Liability Defense Section are currently interpreting ARS 41-621 et seq. to prohibit state insurance coverage of any person or body which is not a part of state government. This is contrary to long-standing interpretation and practice. It has the effect of making it very expensive or impossible for a university to enter into a vast array of normal (and otherwise legal) leases, lease/purchase agreements and third party beneficiary transactions. In addition, there has been some difficulty obtaining cooperation and cost sharing where a lawsuit is filed that alleges grounds for relief that would normally be defended by state risk management and grounds that would normally be defended by university legal counsel.

It is recommended that the Department return to long-standing interpretation and practice as it relates to this law.

ARS Section 41-621(A)(3): Purchase of Insurance

The statute provides for insurance coverage of state departments, agencies, boards, commissions, officers, agents and employees. The State Risk Management policy document "Who is Covered" denies coverage for student organizations that are not part of the educational curriculum.

The universities contend that all properly authorized clubs and organizations are part of the overall educational experience of students. Small clubs cannot purchase their own insurance as it is unavailable or prohibitively expensive. It would appear that a value judgement is being made as to the educational significance of certain activities. This causes great concern for clubs, faculty advisors and University Risk Management who must determine if a club's activities can be authorized and adequately covered by insurance.

Properly authorized and supervised club and organizational activities should be covered as agents of the state, provided they are engaged in activities within the scope of their function. Criteria could be established to define which activities (i.e., alcohol, certain personal injuries) are specifically excluded.

ARS Section 41-622(C): Revolving Funds for Self Insurance Losses and Administrative Costs

The statute provides for insurance coverage for property theft where there is unforced entry, provided there is a reasonable presumption of theft. The Department of Administration Risk Management Section has set an internal policy to deny all such claims, which indicates that theft cannot be assumed even when all evidence supports such a presumption.

University departments are charged for their portion of the university's insurance premium to the state. When thefts occur without forced entry and coverage is denied to replace the item, then funds which are needed for other purposes must be diverted to replace the stolen item.

The universities recommend that the current policy be revoked and the law be enforced as it is written. When an unforced entry theft occurs, it should be evaluated to determine if a "reasonable presumption of theft" can be made. If so, property claims in this category should be paid.

ARS 42-1301 (Chapter 8, Articles 2, 14): Sales and Use Tax

The charging of a use tax on the acquisition of scientific equipment for projects sponsored by federal grants and contracts from out-of-state vendors has been a time-consuming task. In January, 1979, the Arizona Department of Revenue directed all state agencies to begin payment of use tax. In April, 1983, SB 1107 voided the use charge for the calendar year 1982. The use tax charge mechanism remained in effect without resolution as to the final outcome of use tax liability after 1982. Presently a use tax is being charged and remitted to the state.

It is suggested that the legislature repeal ARS 42-1301 since the title for equipment acquisitions from federal contracts passes to the federal government, which is not subject to sales or use tax, based on an exemption provided under statute. Since the state benefits from both the research conducted and the acquisition of highly specialized scientific equipment, it seems inappropriate for the state to levy a use tax.

Abandoned Property

In recent audits, the Arizona Department of Revenue found that the universities were not complying with a state law that requires remittance of uncashed university checks to the Department after seven years. Annual revenue to the Department would be approximately $30,000 from the three universities. The administrative requirements are onerous. Uncashed checks must be accompanied by a list with payee's name, Social Security number, and last know address.

The universities have been depositing these checks into general university funds to benefit public purposes. The universities are ready to remit funds to anyone who proves that he or she is the rightful owner.

The policy should be changed so that it is consistent with current university practice.

Capitalization Threshold

The Arizona Department of Administration sets $300 as the limit for capitalization and control over moveable equipment. Federal requirements set the limit at $500 for indirect cost recovery through grants and contracts. The federal limit may even be increased.

The current state limit should be increased, and periodic adjustments instituted to tie it to federal regulations. This would promote efficient university operations.

Board Policy Manual, Section 3-203(B): Research Contracts and Public Service Agreements

New contracts in excess of $400,000 and continuation of existing contracts in excess of $600,000 must be brought before the Board for approval.

The universities believe they are unable in some cases to execute certain contracts because of lengthy delays in waiting for Board approval. The long lead time required for contract items to be put on the Board agenda, plus the fact that the Board meets only 10 times per year, is a handicap. Often, the Principal Investigator is not aware of the award in sufficient time to meet the agenda deadline. Any delay is upsetting to Principal Investigators and others to be employed on the project, because the Principal Investigator usually gears himself/herself to start when the sponsor issues the award.

It is recommended that university contracting offices have the authority to sign all contracts, as well as intergovernmental agreements and awards with foreign involvement. Information concerning the awards would be submitted for ratification at the next Board meeting. If the Board does not ratify a particular contract, then the university could negotiate with the sponsor and resolve the problem.

Board Policy Manual, Sections 3-801-809: Procurement Procedures

Current board policies dealing with procurement policies have no provisions for taking advantage of pricing discounts that result from payment received in a short period of time (e.g., 4% discount/10 days, net/30 days). Additionally, it is difficult to meet critical deadlines for ordering to take advantage of special pricing due to the approval process for purchasing. The number of approval signatures required and the administrative level of those signatures prohibit timely processing of requisitions.

It is recommended that such a provision be added to the current procurement procedures.

Board Policy Manual, Section 3-402: State Operating Budget Transfer Policy; ARS 35-173; Annual Appropriations Bill SB 1209, Chapter 334, Laws of 1987; JLBC Appropriations Report for FY 1988

A university may transfer from one line item to another line item or from one program to another program in the operating budget, and report such transfers to the Board at the end of each quarter. Board policy further states that no transfer to personal services or employee-related expenditure categories shall be made without prior approval of the Board.

The JLBC Appropriations Report specifies FTE position and Personal Services dollars in detail by program. ARS 35-173 sets conditions of transfers among the expense categories for state agencies. The universities are specifically exempted. Board policy 3-402 is in the "spirit" of ARS 35-173, which is for other agencies, whereas the board approves budget transfers (between lines/ program-post; to personal services, ERE-pre). The SB 1209 appropriations bill does not specify the number of FTE positions whereas the JLBC appropriation report does. The actual FTE positions used by the university is reported annually as a part of the legislative request. Allotment processes and claims on appropriated dollars to the State Accounting Office do not include data on FTE positions. To date the at least one university states that it has never exceeded the FTE position limitations as displayed in the JLBC Appropriations Report.

The combination of both an FTE position and Personal Services dollar limit, greatly reduces the institution's flexibility to address its dynamic environment. The restrictive combination of FTE positions and dollars causes further restrictions where positions may be available within one class while dollars are available within another.

It has been recommended that the FTE position restrictions be lifted from the universities to allow management to effectively address its needs. Annual actual FTE position usage reports would allow for Board management information needs.

ARS 35-141, et seq.: Public Finance

Currently, all funds pertaining to state accounts are maintained in Phoenix. This includes funds appropriated as well as related revenues that each university pays into the state treasury. Since payroll is issued by warrant against the state bank accounts, the claiming procedures for payroll are efficient, i.e., documents are prepared that move funds at the state level to the payroll clearing accounts. However, non-personnel related expenditures are first paid out of local funds. This is to insure prompt and reasonable payment to local vendors, but then necessitates a claiming process from the state to replenish university local accounts by state warrants. This entire process requires, in addition to normal document and check issuing procedures, a separate daily process of accumulating required information, preparation of state forms, submission to the state general accounting office for their eventual processing, recording of expense and issuance of warrants to be returned to each university for deposit. The current process is time consuming and counterproductive since it is duplicative. It also results in foregone interest income since each university uses local funds to provide a cash float for the state while awaiting reimbursement, normally about five days.

It is suggested that state appropriated funds should be allocated on a monthly or quarterly basis and transferred directly to university bank accounts. This change would bring the universities into a state allocation basis consistent with allocations for secondary schools and community colleges.

ARS 35-174: Vacancy Savings

A "vacancy saving" is defined in the statute as any monies saved or generated in personal services and employee related expenditures by:

(1) Not filling a position which has become vacant by termination of an employee;

(2) Not filling a newly authorized position;

(3) Filling an authorized position at a grade or step lower than is authorized by the legislature;

(4) A downward reclassification of an authorized position.

The statute states that a vacancy saving shall not be expended by the budget unit, except upon approval of the director of the Department of Administration, for any of the following purposes:

(1) Awarding merit increases to state employees;

(2) Funding reclassified positions;

(3) Creating new positions that exceed the total number of full-time equivalent positions as approved by the Joint Appropriations Committees and reported annually in the appropriations report.

An unexpended vacancy saving shall revert to the fund from which appropriated except as provided in ARS 15-1661(C). The reversion shall occur at the end of each fiscal year.

ARS 15-1661 provides that, for education, savings are not reverted to the fund from which appropriated but placed in the fund carry forward to the next fiscal year. In practice the "vacancy savings" for the universities is reflected in the appropriation as a negative 1% adjustment to the salary base (e.g., the "expected savings" are not appropriated).

The ability to adjust at the margin the Personal Services/ERE allocations by position type is central to each university's ability to adjust its resources within its dynamically changing environment. The budgetary constraints of adjusting the Personal Services base by the negative 1% effectively overrides the intent of ARS 35-1874 and ARS 15-1661 and arbitrarily limits the flexibility of the universities.

600

It is recommended that the legislature repeal ARS 35-174 to allow the needed flexibility.

Board Policy Manual, Section 3-803(D): Procurement Procedures

Current Board policy provides for procurement without sealed bids for purchases under $10,000.

This limit is unrealistic and additionally lacks an inflation clause so that the amount can be adjusted as inflation decreases the purchasing value of the dollar.

It is recommended that the legislature raise the limit which requires sealed bids from $10,000 to $50,000. It is also recommended that discretion should be given to the universities in the selection of firms when acceptance of a low bid is inappropriate due to the unacceptable quality of previous work.

Board Policy Manual, Section 3-804(B): Procurement Practices

This section of the Board procurement practices limits the construction work that may be done by in-house employees to a value of $10,000.

Many renovation projects which are within the scope and expertise of the Physical Resources Department are unnecessarily delayed.

It is recommended that the force account work limit be raised from $10,000 to $50,000.

Board Policy Manual, Section 3-810(C): Procurement Practices

Board policy on small business procurement requires an annual report. In order to generate the report, records must be kept of procurement made from "small businesses." All that is required is good faith effort by the universities. The report is not required to be submitted to the Board.

A certification from the procurement officer to the Board that the University is making a good faith effort to comply with the policy should be all that is required. The report serves no management information purposes and seems to serve no other function.

FEES, RESIDENCY AND FINANCIAL AID

The Higher Education Amendments of 1986 (Public Law 99-498) and the Higher Education Technical Amendments Act of 1987 (Public Law 100-50)

These statutes made major changes in the student aid programs for calculating financial need.

Sweeping changes to need analysis require programming of computer systems to calculate financial need efficiently and accurately, as required by law. The delays in such programming can result in lessened ability to recruit students and make early awards. These changes may also affect aid availability for independent students, reduce aid amounts for single parents, and will, in the short run, create unnecessary confusion and concern among students.

The Board should encourage federal law makers and Department of Education officials to prepare changes and notify schools in a timely manner so that necessary data processing modifications can be made.

Tax Reform Act of 1986

Current tax law requires that students receiving stipends or tuition reductions for services pay income tax on the amount of the stipend and/or reduction, even if the service was a degree requirement.

Taxing the stipends and tuition waivers of graduate assistants has a serious negative impact on graduate education. Because the stipends are relatively low and non-competitive, graduate study at the universities has become even more economically difficult if not impossible for many outstanding students. The reduction in the number of exceptional individuals in graduate school comes at a time when the state and nation are in dire need of highly trained manpower.

It is recommended that the Board and the State of Arizona communicate their support for technical corrections to the Tax Reform Act of 1986 that will terminate the tax liability of stipends for services and tuition reductions.

Federal Regulations Affecting F-1 Students

With the passing of new regulations affecting students with the F-1 visa classification, new quasi-governmental responsibilities have been placed on school officials, primarily the international student advisor. These responsibilities consume excessive amounts of time, thus preventing staff from giving full attention to the many educational needs of international students. While this policy would be difficult to change, it places severe pressure on the international student office.

Board Policy Manual, Section 4-101: Tuition and Fees

This policy identifies the Board's authority to set tuition and fees. Each year a schedule is authorized by the Board. The large jump in fees between 6 and 7 credits has been noticed by all graduate students. The net result is that registration for more than six credits is rare. Thus, graduate students are typically under-registered for the amount of effort required by the faculty. The FTE count is negatively affected and the number of full-time graduate students under-reported.

It is recommended that the Board scale the per unit cost so that discontinuity does not exist. This would result in an increase in the total number of graduate credit hours and more accurately reflect the actual instructional workload.

Board Policy Manual, Sections 4-101,104: Tuition and Fees

The plan for setting tuition requires an extraordinary amount of staff time. Because of the need to redefine the adequacy of financial aid as a part of the tuition-setting process, staff resources are repeatedly used to derive the same conclusions:

1) There is inadequate grant funding available and the loan burden has become a disincentive for many students.

2) If debt limits are not a concern, there is adequate aid for in-state, single, undergraduate students.

3) Single parents and non-residents will suffer the greatest impact from tuition and fee increases.

Staff resources could be available for other services.

The following changes were recommended to improve management and flexibility:

1) Determine tuition and fees in accordance with the presidents' plan, but without regard to evaluating financial aid.

2) Conduct a separate review of predefined financial aid reports to determine trends in aid on the campus. This would mean that student aid would be viewed as a separate but related issue and judgement on the adequacy of aid would be based on an assessment of data against a predetermined standard.

3) Act/decide on financial aid separately from tuition-setting by creating/funding new aid programs or expanding existing programs.

Board Policy Manual, Sections 4-201-205: Classification of Persons for Tuition Purposes.

Two recent amendments to the parameters for determining tuition status have caused considerable difficulty for Residency Classification Offices in their application. One came in 1985 when state law was amended to allow for the granting of in-state tuition status to "any student who is an employee of an employer which transferred him to this state for employment purposes or who is the spouse of such an employee." The other was enacted in November, 1986 when the Board Policy Manual, Section 4-203, was amended to state that "an alien shall be classified as an in-state student if the alien can establish that on or before the last day of registration the alien: meets other residency criteria" and does "not hold a visa that prohibits establishing domicile in this state."

Each of these guidelines is difficult to apply due to their lack of specificity. The allowance for persons who have been transferred by their employers to Arizona presumably was intended to apply to persons whose employers have required that they be willing to transfer to Arizona in order to maintain job security and advancement. However, many students who worked for an employer outside of Arizona and will continue to work for the same employer in Arizona while attending the university seek in-state status under this provision. This includes students who may have worked for a restaurant chain while in high school and will work for the same chain while attending the university on a full-time basis.

Board Policy Manual, Section 4-301(D): Registration Fee Waivers

Under this policy, the universities are required to adjust a student's need based on other aid received. In the past this section has been interpreted by the Board and its staff as requiring the universities to continually carry out such reviews.

While it appears that there is now an understanding clarifying this policy to require initial reviews rather than continual reviews, the policy might be formally revised to conform to the understanding which reflects current university practices.

Board Policy Manual, Section 4-301: Registration Fee Waivers

Present federal guidelines for financial aid preclude many re-entry students - those over 25 years of age who have had an interruption in their education - from being eligible. Specifically, the criteria for Pell Grants and/or loans does not allow re-entry students to quit their jobs and return immediately to college because the adult student's previous year's income is usually too high to meet current guidelines. In reality, the loss of income to go to school necessitates some financial assistance for those students, particularly since many of them have dependents and other expanses. Consequently, a more liberal policy regarding the financial aid criteria should be adopted, considering the economic realities of non-traditional adult students. Students should not be punished for trying to make an adult living wage.

Board Policy Manual, Section 4-301(D): Academic Scholarships

Under this policy, the universities are required to award no less than 50% plus a given number of all undergraduate fee waivers on the basis of financial need.

University attempts to recruit and retain certain target populations such as minority, re-entry and academically gifted students are often in conflict with these need-based regulations.

Each university could receive approval or report periodically on the use of the waivers in lieu of the policy.

PERSONNEL POLICIES
ARS 38-651.01(A): Group Health and Accident Coverage for Retired Public Employees

The Department of Administration is authorized to, by rule, adopt standards to establish group health and accident coverage for former state employees who are retirees and receiving either income from a retirement program of this state or long-term disability income insurance benefits pursuant to ARS 38-651.03 and their dependents, and to establish eligibility for retired employees to participate in such coverage. The Department of Administration may promulgate rules which provide that if an insured retiree dies before an insured surviving spouse, the surviving spouse is entitled to extended coverage at group rates if the surviving spouse is receiving a retirement benefit check from the state and is otherwise eligible to participate in the plan. Such standards may provide that all or any portion of such former employees or their dependents may be grouped with officers and employees of the state, its departments and agencies or their dependents as necessary to obtain health and accident coverage at favorable rates. In addition, ARS 38-651.01(G) provides that no public funds shall be expended to pay all or any part of the premium of such insurance pursuant to this section.

Even though retirees are eligible to participate in a university group plan, the rising costs of even these health insurance premiums are causing undue hardships for university retirees. Spiraling health insurance costs are a deterrent to employees choosing early retirement.

It is recommended that ARS 38-651.01(G) be changed to incorporate some form of subsidy for health insurance, in whole or in part, for retirees.

ARS 38-651: Expenditure of Funds for Health, Accident and Disability Insurance

This legislation gives the Department of Administration the sole right to procure and control health, accident and disability insurance coverage for state employees. It restricts the universities from negotiating for and procuring their own insurance programs which are more suitable to their needs and are more cost effective to their institution and employees. The universities cannot practice cost containment or shift programs to provide better, less costly benefits.

It is recommended that the statute be amended to allow the state universities to procure and administer their own programs independent of the state and the Department of Administration.

ARS 38-745: Membership in Retirement System

The statute mandates compulsory participation in the retirement plan and excludes classified staff participation in the optional programs accorded employees under the conditions of faculty, administrative and professional service.

If participation in the retirement plan remains compulsory, eligibility for the optional program as defined in statute should be expanded to include classified staff.

State law also requires that all employees who work 50% time or more for three (3) months participate in a retirement plan. This is incomsistent with the eligibility requirement for other benefits which is 50% time or more for six (6) months or longer.

This requirement should be changed to make eligibility consistent across programs. The change would make it easier for the universities to recruit short term employees and temporary staff, many of whom have no intention of vesting in the retirement system.

ARS 43-401: Withholding Tax

State withholding tax rates are inflexible. As a result of the Tax Reform Act of 1986, few employees are able to find a tax rate that deducts the correct amount from each of their checks.

This practice should be changes so that employees might select from a state tax deduction rate consistent with the amount of state tax they need to pay.

Board Policy Manual, Section 6-402: Classification Administration Policy

The Tri-University procedure for establishment or change in job classification or compensation inhibits the institution's ability to respond to its immediate needs. The current system generates needless and burdensome paperwork by requiring extra reports and approval systems.

It is recommended that the Board abolish the Tri-University approval system and permit each institution to respond to its own needs. The Board can audit the process twice each year to ensure compatibility and uniformity among institutions.

Board Policy Manual, Section 6-804 (F):

Sick Leave

State law permits payment of $750 for 1,000 hours of unused accrued sick leave at retirement. Because the dollar and hour amounts are so low they act as a disincentive to employees, encouraging the use of sick leave rather than its accrual.

This law should be changed and a more innovative policy adopted. Examples of such policies include combined vacation/sick/personal leave (sometimes referred to as "paid time off"); converting unused sick leave to vacation time at a 2:1 ratio; use of sick leave in calculating service for retirement purposes; and early retirement based on unused sick leave.

Board of Medical Examiners Rules for Licensure

Rules for licensure in the State of Arizona are unnecessarily cumbersome and involve large delays in licensing medical practitioners who are faculty members at the College of Medicine.

It is recommended that the Board meet with the Dean of the College of Medicine, the President of the Arizona Medical Association and their designees to explore ways in which new legislation may be introduced to reduce unreasonable limits. Also, the Board of Medical Examiners should streamline their operations in order to process licensure applications in as rapid a fashion as is consistent with their mandate and the need for M.D.'s to achieve practice status.

BUILDINGS AND LAND

Board Policy Manual, Sections 7-101-109: Building Construction and Repair

The new five step process with two separate committees required to assess projects is in its first cycle of implementation. Although the full impact of the new process has not been assessed, it may result in lengthy delays and the untimely preparation of a burdensome amount of information which may impair efficient staff resource utilization on the campus.

An annual review of the capital construction approval process should be undertaken to assess how to balance the timely provision of appropriate information with reasonable campus staff effort.

Administrative Rules and Regulations for State Agencies, R2-10-201: Submission of Building Plans

This state rule requires agencies to submit plans for all construction, alteration, or repair of state buildings to State Risk Management for approval.
This rule assumes that individual agencies have no loss control expertise. The universities have, to varying degrees, employees involved in addressing safety and fire code issues throughout the design and construction of new buildings. Design approval from State Risk Management personnel may be a complete duplication of this effort at some of the campuses. Since state officials are in Phoenix, it is impossible for them to be actively involved in the design process at each campus. Safety

606

and fire code design issues must be addressed on almost a daily basis.

State Risk Management should have the authority to delegate this responsibility to state agencies that have in-house expertise to address these concerns. This will allow the entire design and construction process to proceed more quickly and efficiently.

RESEARCH

The divergent points of view of the Financial Accounting Standards Board (FASB) and the Governmental Accounting Standards Board (GASB) which impact the financial statements of public and private institutions will lead to financial data comparison problems. If the pronouncements are enforced, reporting on a financial basis will be significantly different between public and private institutions of hither education. This may ultimately affect bonding capability as well as other areas.

Continued governmental revisions in the area of Office of Management and Budget Circular A-21 such as the arbitrary limit on departmental administration in the overhead pool and the anticipated revision of A-110 may place more stringent monitoring requirements on institutions than need be in place.

In addition, the federal acquisition regulation issued several years ago has resulted in several federal agencies producing their own interpretation of that document; for example, the Department of Energy and their "DEAR" and other individual agency versions.

EFFICIENCY OF SUPPORT SERVICES WITHIN THE ARIZONA UNIVERSITIES

GEORGE H. DAVIS

ABSTRACT

Faculty, staff, and students were asked to rate the quality, importance, and change in quality of the services provided by selected academic and nonacademic administrative and business operations at the three Arizona universities. At all three universities, faculty, staff, and students rate the overall quality of services to be midway between fair and good, improving slightly, with overall importance of the services considered to be high. Faculty and students at all three universities agreed that the single most important supporting unit is the Library. In fact, the Library is the only operation that received, overall, a very high importance rating from users at all three universities.

Based on the survey results, administrative service operations are grouped, by university, into those rated higher in quality relative to the ratings for the other units; and those rated lower in quality relative to the ratings for other units.

It is recommended that such a survey be implemented at three-year intervals to map changes in quality of service, and to correlate same with administrative decisions and actions.

The consulting firm of Coopers & Lybrand was retained to evaluate management efficiency of the universities, including management efficiency of business operations. The consultants saw no systemic or widespread inefficiency. Although they identified opportunities for improvement of specific administrative functions, overall they found dedicated, highly capable and energetic staff, managers, and executives devoting enormous amounts of time, energy, and talent in efforts to solve the day to day problems and issues facing these complex institutions. If there is a general criticism of management efficiency, it is that administrative information systems as a rule are not providing users with timely and accurate information. This has forced departments to develop and maintain their own (duplicative) records. Duplicative tracking in excess of what would be considered normal is unavoidable in research-active departments where requirements for up-to-date and accurate information on personnel, payroll, purchasing, telephone, mail, and garage are

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George H. Davis joined the faculty of the University of Arizona's Department of Geosciences in 1970, following PhD studies at the University of Michigan. His research and teaching have centered on the nature and origin of structures in mountain belts. Davis' undergraduate textbook, Structural Geology of Rocks in Regions, has extended his reach as a teacher to students outside of Arizona, in other parts of the country and the world. He also served as Head of the Department of Geosciences and and serves as Vice Provost for Academic Affairs at UA.

absolutely crucial to responsible management of state, local, and grant/contract funds.

Based in part on the user survey described above, Coopers & Lybrand chose to examine in closest detail Personnel, Physical Resources, and Procurement. With respect to Personnel, Coopers & Lybrand report faculty and staff criticism of each university's ability to recruit and hire faculty and staff in a timely manner, and to reclassify staff positions.

With respect to Physical Resources, facilities were found to be clean, the grounds well maintained, and the quality of renovation work up to expectations. However, Coopers & Lybrand report widespread customer dissatisfaction with the high costs and long lead times associated with renovations. They observe that relationships between Physical Resources and user departments are strained. Customers believe that costs charged by Physical Resources on each of the three campuses are not competitive with market prices. Coopers & Lybrand conclude that work estimates and job tracking are inadequate in light of industry norms.

With respect to procurement, the primary complaint of customers at all three universities is the inability of the existing system to respond to needs in a timely fashion. Coopers & Lybrand believe that the procurement functions are overly dependent on manual, paper-intensive systems which cause unnecessary effort and delay, and which provide inadequate information and performance measurements. The process tends to deal with requisitions sequentially and has difficulty sorting transactions according to size, priority, and complexity. The same signatures, verifications, buyer handling, and data entry take place for almost all purchases, whether $50 or $50,000.

RECOMMENDATIONS

The universities should seek to reduce personnel-related paperwork and streamline Personnel processes. University Physical Resources Departments should respond to user complaints of long lag times and unreasonable costs through improved services. Ways should be found to demonstrate and assure that Physical Resources costs are competitive with the private sector. The Arizona universities should develop systems and functions to improve the procurement process. Goals, objectives, and priorities should be established based in part on communication with key customer groups and vendors.

SURVEY OF FACULTY, STAFF AND STUDENT OPINION

Faculty, staff, and students were asked to rate the quality, importance, and change in quality of the services provided by selected academic and nonacademic administrative and business operations at the three Arizona universities. Methods, data, and results are presented in the EEC working paper entitled "Survey of Administrative Service Operations at the University of Arizona, Arizona State University, and Northern Arizona University" (2 volumes). A total of 875 faculty/ staff questionnaires and 524 student questionnaires were received, representing returns of 57% and 35%, respectively. At all three universities, faculty, staff, and students rate the overall quality of services to be midway between fair and good, improving slightly, with overall importance of the services considered to be high. No significant differences were found to exist in the overall ratings of quality of administrative service operations for each university.

Based on the results of the survey, administrative service operations at each university were grouped into those rated higher in quality relative to the ratings for the other units (Table 1); and those rated lower in quality relative to the ratings for the other units (Table 2).

Units Rated Higher in Quality Relative to Other Units Table 1

UA	ASU	NAU
		Academic Vice President's Office
Bookstore	Bookstore	Bookstore
	Academic Computing	Academic Computing
	Cultural Events	Cultural Events
Dean of Student's Office		
Fast Copy Center	Fast Copy Center	Fast Copy Center
Food Services		
Garage/Motorpool		Garage/Motorpool
	Graduate College Office	Graduate College Office
Grounds Maintenance	Grounds Maintenance	Grounds Maintenance
Library	Library	Library
Payroll	Payroll	Payroll
	Personnel	Personnel
Printing/Reproductions	Printing/Reproductions	Printing/Reproductions
Risk Management		
Security/Police	Security/Police	
Sponsored Projects		Sponsored Projects
Student Health	Student Health	Student Health
	Telephone	Telephone

Higher quality marks for administrative service operations at The University of Arizona go to Bookstore, Dean of Students Office, Fast Copy Center, Food Services, Garage/ Motorpool, Grounds Maintenance, Library, Payroll, Printing/ Reproductions, Risk Management, Security/ Police, Sponsored Projects, and Student Health. Lower quality marks go to Academic Computing, Core Accounting, Custodial Services, Financial Aid Office, Graduate College Office, Mail Service, Parking, Personnel, Planning/ Construction, Purchasing, Repair/ Remodeling, and Residence Halls.

Higher quality marks for administrative service operations at Arizona State University go to Bookstore, Academic Computing, Cultural Events, Fast Copy Center, Graduate College Office, Grounds Maintenance, Library, Payroll, Personnel, Printing/ Reproductions, Security/ Police, Student Health, and Telephone. Lower quality marks go to Dean of Student's Office, Core Accounting, Custodial Services, Financial Aid Office, Food Services, Mail Service, Parking, Planning/ Construction, Purchasing, Repair/ Remodeling, Residence Halls, and Risk Management.

Higher quality marks for administrative service operations at Northern Arizona University go to Academic Vice President's Office, Bookstore, Academic Computing, Cultural Events, Fast Copy Center, Garage/ Motorpool, Graduate College Office, Grounds Maintenance, Library, Payroll, Personnel, Printing/ Reproductions, Sponsored Projects, Student Health, and Telephone. Lower quality marks go to Affirmative Action

Office, Dean of Students Office, Administrative Computing, Core Accounting, Custodial Services, Financial Aid Office, Food Services, Mail Service, Parking, Planning/ Construction, Repair/ Remodeling, Risk Management, and Stores.

Faculty and students at all three universities agreed that the single most important supporting unit is the Library.

In fact the Library is the only operation that received, overall, a very high importance rating from users at all three universities. Staff regard Telephone, Mail, Security/ Police, and Payroll as especially important. Operations other than the benchmark to help evaluate administrative decisions and actions that impact distribution of resources and changes in organization, leadership, and policy. For example, at the present time the University of Arizona is constructing three parking garages on campus, the first ever. How will this investment of resources, and subsequent management of resources, be reflected in the next user survey of the quality, change in quality, and importance of Parking as viewed by University of Arizona faculty, staff, and students? Will user perception of quality of Parking climb? If so, by how much? Based on longitudinal studies of user opinion, can we eventually conclude what in fact is an acceptable rating for quality of Parking?

Table 2

Units Rated Lower in Quality Relative to Other Units

UA	ASU	NAU
		Affirmative Action Office
	Dean of Student's Office	Dean of Student's Office
Academic Computing		
		Administrative Computing
Core Accounting	Core Accounting	Core Accounting
Custodial Services	Custodial Services	Custodial Services
Financial Aid Office	Financial Aid Office	Financial Aid Office
	Food Services	Food Services
Graduate College Office		
Mail Service	Mail Service	Mail Service
Parking	Parking	Parking
Personnel		
Planning/Construction	Planning/Construction	Planning/Construction
Purchasing	Purchasing	
Repair/Remodeling	Repair/Remodeling	Repair/Remodeling
Residence Halls	Residence Halls	
	Risk Management	Risk Management
		Stores
Telephone		

Library that are viewed as especially important by students are Registration and Records, Student Health, Financial Aid, and Parking.

We recommend that a survey of the type described in "Survey of Administrative Service Operations ..." be conducted at three year intervals in order to track changes in quality through time. The user survey data collected in this initial pilot study would then provide a

EVALUATION OF MANAGEMENT EFFICIENCY BY OUTSIDE CONSULTANT

Fundamental Issues

The consulting firm of Coopers & Lybrand was retained to evaluate management efficiency of the universities, including the management efficiency of the business operations. They found that the universities are functioning without systemic or widespread inefficiency.

However, Coopers & Lybrand identify three issues that bear importantly on management efficiency:

1. Inadequate information to support decision making;
2. Cumbersome processes and procedures; and
3. Inadequate performance accountability.

These issues tend to prevent the highly capable, energetic personnel at the three universities to operate as effectively as they might.

It immediately became apparent to Coopers & Lybrand consultants that administrative information systems as a rule have not kept pace with user needs for timely and accurate information. This has forced departments to develop and maintain their own records. Academic and nonacademic departments rely less and less on the information contained in the central computer systems. As a result, personnel, capital equipment, and space resources that might otherwise be invested in direct back-up technical support for teaching, research, or public service must be invested in additional "business service" requirements.

What normally would be considered excessive duplicative tracking is presently unavoidable in research-active departments where requirements for up-to-date and accurate information on personnel, payroll, purchasing, telephone, and garage are absolutely crucial to responsible management of state, local, and grant/ contract funding. The need for duplicative tracking intensifies during times of budget cutbacks, when departments must watch every expenditure as they try to maintain their normal levels of teaching, research, and public service while operating on significantly reduced budgets.

Coopers & Lybrand recommends that the universities develop and strengthen their capacity to manage the information needs of academic and nonacademic departments. The universities should develop policies on collection and ownership of data, on access, use, and security of data, and on standardized definitions and units of measure for commonly used data. In addition, universities should identify the information needs held in common by departments, and should develop database systems to communicate data and information.

Coopers & Lybrand's awareness of cumbersome processes and inadequate performance accountability arose primarily through close review of the Personnel, Physical Resources, and Procurement offices at each of the three universities. These operations were singled out for review on the basis of what was learned during the early interviews conducted with faculty, staff, administrators, and business managers, and on the basis of the results of the user survey described above.

PERSONNEL

Coopers & Lybrand became aware of faculty and staff criticism of each university's ability to recruit and hire faculty and staff in a timely manner, and to reclassify staff positions. They found that the problem is especially acute for research-oriented departments that depend on specialized technical staff hired for sponsored research projects of limited duration. Some researchers complained that it normally took six months to get new employees on board because of delays in personnel paperwork and procedures. Coopers & Lybrand found it is easy to understand why things take so long, given for example the large number of signatures required on personnel action request forms even before job posting and recruiting can begin. In one example reviewed, a routine personnel requisition for a clerk typist was submitted on September 30, 1987, yet formal approval was not received until November 2, 1987, because of time taken by the unusually large number of people who had to review and sign-off on the document. Cases in which it has taken as long as two years to get a position reclassified are not uncommon.

According to Coopers & Lybrand, some of the inefficiencies in Personnel have arisen through duplicative activities spread among a number of departments throughout each university. Each university has established its own methods for dealing with recordkeeping and recordprocessing requirements as the needs have arisen. Coopers & Lybrand note that there is a fragmentation of personnel responsibilities in areas such as compensation, employee benefits, and the routing of recruiting applications.

Coopers & Lybrand recommends that each university adopt a policy for recruiting which would centralize responsibility for the recruiting function. Furthermore, they believe the universities should seek to reduce personnel paperwork and to streamline personnel processes. For example, the number of signatures required on personnel action request documents should be fewer in number, and employee appraisal forms should be reduced in complexity, number, and size.

PHYSICAL RESOURCES

Physical Resources management at the Arizona universities is a $60,000,000 a year operation responsible for the care, upkeep, and renovation of 800 buildings sited on almost 2,000 acres of land with a combined estimated replacement value of $1,600,000,000. The Physical Resources Departments of the three universities employ approximately 1,300 people ranging from custodians and grounds-keepers to highly qualified specialists and administrators.

Coopers & Lybrand notes that facilities were found to be clean, the grounds well maintained, and the quality of renovation work up to expectations. However, they also report widespread customer dissatisfaction with the high costs and long lead times associated with renovations. As a result, the relationships between Physical Resources and user departments are strained.

Customers believe that the fees charged by Physical Resources on each of the three campuses are not competitive with market prices. Bills do not always provide a clear picture of costs and are criticized as arriving too late for customers to question the contents. The universities do not appear to have established cost-effectiveness objectives for their Physical Resources Departments.

Coopers & Lybrand urges that ways be found to demonstrate and assure customers that Physical Resources costs are as competitive as possible with the private sector. Physical Resources Departments should develop capabilities to support users in incorporating practical, realistic budgets for renovations into decision package proposals and into grant proposals. More consistent and better understood chargeback policies should be developed, and Physical Resources Departments should clearly define consistent policies and guidelines for determining building and customer charges for service. The universities should explore the use of standard prices for common projects, expanded use of outside contractors for specialized services, and the implementation of "handyman" programs to take care of small jobs in short order.

According to Coopers & Lybrand, unnecessarily low thresholds imposed by state statute requiring competitive procurement of outside maintenance and repair services are wasting time and money. The human efforts and time delays associated with bid document preparation for very small jobs may cost as much as the contracted work itself. Under present conditions, management has no flexibility to explore whether certain jobs over $10,000 could be more efficiently accomplished in-house or through contract to an outside firm. Coopers & Lybrand note that many public universities in other states impose no such dollar limits on physical resource departments.

Given such costly rigidity, Coopers & Lybrand recommend that the $10,000 threshold for competitive bidding of building renovations be increased to $50,000 in order to allow Physical Resource management the flexibility of completing jobs in-house or contracting outside vendors. This will require legislative action. Jobs falling between $10,000 and $50,000 can be done in-house, contracted to a vendor, or competitively bid between in-house and private sector bidders. Jobs estimated between $50,000 and $100,000 should be competitively bid, but on a shortened form.

Coopers & Lybrand believes that the timeliness and productivity of Physical Resources Departments at all three universities could be improved. Existing work estimating and job tracking systems are inadequate. Communicating to customers about job priority and job timing is poorly done. No competitive testing of timeliness of service delivery is being conducted. Large work backlogs exist in some trades, yet no outlets exist for peak workload demands other than expensive overtime and very limited contracting out.

The timeliness, productivity, and customer relations of Physical Resources Departments at all three universities could be improved with more automation, specific performance standards, and better communication. Performance measures and reporting systems could be emplaced to monitor and control productivity, quality, and timeliness, and to arrange jobs in order of priority. Specific response-time performance criteria should be established for standard jobs. Jobs which cannot be designed and completed within the requirements specified by the customer should be considered for competitive bids.

In order to improve service, Physical Resources Departments should develop capabilities to support users in developing practical, workable timetables for renovations, and to deliver on the schedule that is established. Information systems should be developed at all three universities to track work requisitions, their stage of completion, estimates to complete, actual completions, and variances. Information on total "throughput" time should be systematically collected, analyzed, and reported to senior university executives. In fact, each university's leadership should periodically establish and monitor priorities among the various jobs that originate in the teaching and research components of the universities.

Coopers & Lybrand suggests that each university establish a policy review board of university officials and academicians to advise the Vice President for Business Affairs Administration to resolve complaints about poor performance (cost, timeliness, or quality), and to communicate user suggestions for possible improvements. Furthermore, Coopers & Lybrand observes that the relationship between Physical Resource Departments and academic departments could be strengthened through periodic meetings.

PROCUREMENT

In 1986-87, the Arizona universities procured over $220,000,000 in goods and services in support of academic, administrative, and research activities. Customers at all three universities complain about the inability of the existing system to respond to needs in a timely fashion. Coopers & Lybrand found that the procurement functions are overly dependent upon manual, paper-intensive systems which cause unnecessary effort and delay, and which provide inadequate information and performance measurements. The process tends to deal with requisitions sequentially and has difficulty sorting transactions according to size, priority, and complexity. The same signatures, verifications, buyer handling, and data entry take place for almost all purchases, whether $50 or $50,000.

Coopers & Lybrand notes that the purchasing function is centralized at each university, but the process for managing procurement transactions and expenditures involves a variety of departments within several organizational divisions of each university. Each department within the process performs certain activities which contribute to overall result, but customers must locate and deal with several individual components of the procurement process to fulfill basic needs and resolve problems.

Coopers & Lybrand describes this type of procurement process as a control system that happens to provide a service, rather than a service enterprize with built-in controls.

Senior management at each Arizona university has historically assigned a low priority to paperwork reduction and process efficiency through the automating purchasing. The procurement process is thus mired in paperwork and desktop bottlenecks, diminishing both customer service and buying effectiveness. Each requisition sits in a variety of queues as it is handled within the procurement process. Rudimentary departmental management information in the procurement area is therefore either unavailable or very difficult to collect, resulting in management based on "gut feel" rather than on facts.

Coopers & Lybrand concludes that the fragmented, control-oriented, paper-bound procurement systems are hampering overall university effectiveness by placing troublesome and time consuming barriers in the path of the day-to-day business of faculty, staff, and administration.

Examples of information the universities were unable to provide to Coopers & Lybrand included number of purchase requisitions processed, number of vendors, volume per vendor, purchase requisition turnaround time, and distribution of the number and amount of purchases by size. Data are not being analyzed to identify customer purchasing patterns, typical commodities needed, and predictable or seasonal procurement requirements. Although the requisition, review, and approval process may vary depending on the originating department, the typical purchasing requisition makes several stops before its arrival in purchasing. Included in the process may be a department head, a dean or vice president, president, contracts and grants accounting, general accounting, purchasing, and accounts payable.

The fragmented and procedural orientation of the process does not enable the universities to effectively provide customer services and to manage vendor relations. Customers must deal with individual components of the procurement process to fulfill basic procurement needs and to resolve problems. Tracking down the status of a requisition can be time consuming and frustrating in such an environment. Many customers complained that unless they kept checking on the status of their orders, the orders were put aside and eventually were buried or lost under stacks of paper. From a customer perspective, the processes were described as bureaucratic, unresponsive, and burdensome. At each university the process is widely viewed as an obstacle that must be overcome or avoided in conducting day-to-day operations of the university departments. For those who manage and work within the process, it is a source of frustration. High transaction volumes, customer complaints about service levels and tension between departments contribute to defensiveness and hamper effectiveness.

Coopers & Lybrand recommend that the Arizona universities should develop systems and functions to improve overall coordination and control of the entire procurements process. Each of the universities should appoint a senior executive to oversee the overall procurement process. This individual should have line authority over some components of the procurement process (e.g., purchasing and contracting) and staff authority over the entire range of procurement functions. Each university should define and establish information requirements and develop reporting systems to support, monitor, and control the procurement process as a whole. Each university should strive to improve the buyer/ customer relationships and university/ vendor relationships.

The procurement manager should have responsibility for establishing goals, objectives, and priorities for procurement. He/ she should be given authority to implement changes and improvements in consultation with other responsible managers. He/ she should meet with key customer groups and vendors to ensure that objectives are understood and met. Procurement information systems at each university should produce the basic information, such as overall processing time; number and value of purchase orders processed, by category; requisitions received; percentage of purchase orders awarded; requisitions backlog analysis; and average purchase order processing time.

RECOMMENDATIONS

- The universities should seek to reduce personnel-related paperwork and streamline personnel processes. The number of signatures required on personnel action request documents should be reduced significantly.

- Physical Resources Departments should respond to user complaints of long lag times and unreasonable costs through improved services.

- Ways should be found to demonstrate and assure that Physical Resources costs are competitive with the private sector.

- The Arizona universities should develop systems and functions to improve the procurement process. Goals, objectives, and priorities should be established based in part on communication with key customer groups and vendors.

PROGRAM DUPLICATION IN ARIZONA UNIVERSITIES

ROBERT MACVICAR

During its study, the Task Force addressed the issue of the degree to which duplication of programs among two or three of the universities diverts resources from other priority needs of higher education. Program duplication, insofar as it exists in Arizona, must be viewed from a different perspective than is the case in states that have more campuses or a more dispersed population distribution. Hence, the criteria to be applied to indicate programs which should be reviewed by the universities and by the Regents for unnecessary duplication must be carefully developed and used with caution. In dealing with the efficient use of resources and program quality, program duplication represents a target for continuing review.

Duplication of a program at more than one site is justified by factors internal to the universities offering the programs and external in the environment, most significantly demand by place-bound individuals. If there is congruence between the internal and external need for the program, justification for offering two or more opportunities is more easily defended.

Internal needs for program duplication are usually related to program quality. Specific arguments for duplication are:

- o The opportunity to teach the upper-division courses required by majors in a discipline enhances the departments' ability to attract and retain a more qualified faculty.
- o In the absence of the challenge of majors with their special interest in the subject, faculty who remain may become "stale," with a resulting reduction in quality of instruction in the general education courses.
- o Absence of graduate students significantly hampers research. The most talented faculty face serious handicaps in maintaining a vigorous research program.
- o A relatively broad array of graduate programs is characteristic of a "comprehensive research university."

External needs justifying program duplication usually relate to demands which are substantial. Therefore, further reduction in cost through "economy of scale" factors does not justify the denial of access to place-bound persons.

Robert MacVicar, President-Emeritus of Oregon State University served as the chief executive of that institution during 1970-1984. He previously was Chancellor of the Southern Illinois University at Carbondale and Edwardsville, Vice-President for Academic Affairs, Dean of the Graduate School, Head of the Department of Biochemistry and Professor of Chemistry at Oklahoma State University. He holds degrees from the University of Wyoming (BA), Oklahoma State University (MS), and the University of Wisconsin. He is the author of numerous publications in his professional area of biochemistry and nutrition. He has served on numerous national committees and as a consultant to state, national and international organizations in the field of higher education. He has sercved as Executive Director of the Task Force on Excellence, Efficiency and Competitiveness.

- A significant number of programs have a societal demand for graduates so great that duplication does not significantly increase unit costs (cost per student credit hour).

- Population pressure for access is sufficient to justify duplication in more than one metropolitan area, particularly for that fraction of the student population who are "place bound" by economic or other reasons.

- Physical restraints (campus size, transportation networks) are sufficiently critical to justify program duplication in the same metropolitan area.

CURRENT STATUS OF PROGRAM REVIEW

Program evaluation in the Arizona universities on a decennial basis is currently required by Board policy. The procedures vary among the universities but usually involve external consultants and the development of a report followed by review by Board staff and the Board. Since the process focuses on internal criteria of adequacy, the issue of duplication is not significantly addressed in the review process, although the existence of the same program in another university (or universities) may effect the demand for and hence the size of the student body in the program. The adequacy of decennial program review is dealt with in the report of the Task Force staff and the consultant who examined the process. The report details the findings and makes recommendations about the procedures currently employed and their improvement. While this internal program review can and doubtless will be improved, it is unlikely that it will seriously address the issue of unnecessary duplication.

PROCESS FOR REVIEW OF PROPOSALS FOR NEW PROGRAMS

The most important review process with respect to duplication of programs should be undertaken when a program is in its proposal stage. There are very few baccalaureate degree programs that are not available at one or more of the universities. There is less duplication at the M.S./M.A. level although almost all of the major disciplines are included in the graduate offerings of one or more of the campuses. Doctoral level programs are available in most of the areas offered by the University of Arizona, many of those at Arizona State University and relatively few at Northern Arizona University. At present, no doctoral programs are available at ASU West, although the faculty of this campus may participate in doctoral committees on the main campus at Tempe. The first step in the institution of a new program is the submission of a request for a "planning authorization." This document outlines the justification for the ultimate approval of the degree by the Board and indicates the resources which will be required in terms of faculty time, student stipends or fellowships, and other support supplies and services. The proposing institution indicates the funding sources for the program (reallocation, augmentation by approved decision packages, external funding from resource grants and contracts). In the case of duplicated programs, the demonstration of both internal and external need will require substantially stronger evidence. The proposed new program must be relevant to the strategic plans of both the university and the system.

Experience in other states has demonstrated that avoidance of duplication in the absence of a clearly demonstrable need is far more effective than elimination of programs once they are in place. In the absence of a strong case based primarily on the need of the new program to serve the manpower needs of Arizona, the Board should be reluctant to permit the initiation of duplicate programs at the graduate level. Baccalaureate programs and professional master's degree programs can be justified more readily if significant numbers of place-bound students can be identified. In some situations, however, an accumulated demand may exist but once this is satisfied the number of students on a continuing basis may be too few to justify the program. In such situations, provision of the program by extension may be a more appropriate means of meeting the need.

In attempting to justify new programs, it is not uncommon for universities to assert that "no additional funds are required." Since it is obvious that the creation of a new program will, in fact, incur significant additional costs, the source of these funds within the existing budget should be clearly identified and, in most instances, this must result in diminished effort elsewhere. Changing circumstances bring about shifting program requirements. Universities should be encouraged to review their current offerings with the intent of shifting resources from programs of decreasing demand, particularly if those programs are offered elsewhere in the system and are underutilized.

PROPOSAL REVIEW PROCESS FOR REVIEW OF EXISTING PROGRAMS

The Board policies require each university to examine each program area on a ten-year cycle. This process as it is currently carried out focuses on internal needs for quality enhancement and not on the productivity of the program in terms of degrees conferred.

Because of the potential for increasing efficiency and enhancing quality by phasing out marginal programs, the continuation of which cannot be justified, the Board staff should carry out a systematic survey of all programs on a periodic basis, perhaps every three to five years. Particular attention should be paid to duplicated programs but recognition should be given to programs of low productivity regardless of the issue of duplication, since some programs can be made available by interstate cooperative mechanisms. This review at the level of the Board will permit early identification of problem areas that may appear during the interval between the decennial reviews.

Subsequent to the identification of programs targeted as appropriate for review by the application of the screening criteria, the Regents' staff and the appropriate university officials will study the data and decide whether or not to pursue an in-depth review.

CRITERIA FOR IDENTIFYING PROGRAMS FOR REVIEW

It is recognized that an important and often overriding criterion for the evaluation of a program is the quality of the program and its contribution to other related programs of high demand.

Unique opportunities are offered by the location of the institutions in the semiarid and arid regions of the Southwest. The shared border with Mexico creates special obligations and opportunities for the universities of Arizona. The presence of a large number of American Indians provides an opportunity for investigation and creates a special demand for services. The location of national centers for research in proximity to the universities provides opportunities that are relatively unrelated to the demand for professionals in Arizona.

The criteria listed below are the beginning of a process of review that may go no farther than the Regents' staff, who may recognize a uniqueness in the program that makes a formal review process unnecessary.

The procedure for review should also recognize the authority and responsibility of the leadership of the university to establish priorities within the mission and scope of the institution based on their evaluation of the peculiar circumstances and opportunities of the time and place. The university president, however, will often be assisted in making appropriate decisions if there is clear evidence of Regential support to counter the protests, both internal and external, that inevitably follow a decision to reduce the level of or discontinue a program.

A review of the literature and the advice of a nationally recognized consultant led the Task Force staff to recognize the following criteria as appropriate for the identification of programs for more intensive review, particularly if the program is duplicated within Arizona.

- Degree completions by level (BA/BS, Master's, Doctorates) on an annualized basis. While degree completions are less important in some respects than credit hour production, they do represent the basic output of a degree program and, hence, small numbers are likely to result in high per capita costs. The absence of a "critical mass" of students for effective interaction in the departmental courses for the major (a likely but not necessary corollary) will negatively affect quality. The precise number of degrees at each level to trigger a review is a matter to be negotiated between the Regents' Staff and the Council of President's.

- Number of interactive faculty in the program. Second only to students in significance is the number of faculty to which the students are exposed. By interactive faculty are meant those who actively participate in instruction of the programs, and, for graduate programs, the number who hold Graduate Faculty status and direct thesis research.

- Number of student credit hours taught by level. The number of student credit hours taught at each level is an output indicator that is a highly significant element in the assessment of the efficiency of the instructional unit. In numerous cases, the faculty involved in the major field also provide significant service to the general student body or to students majoring in related areas. Involvement in interdisciplinary programs or in organized research or public service programs must also be considered. Thus, both the number of faculty assigned to the department (or other unit) and the degree to which they are assigned to other than the instructional function will need to be determined.

- Resource indices. The "efficiency" of programs can be measured by such indices as:
  1. cost per student credit hours by level (lower division, upper division, master's level, doctoral level);
  2. by student FTE: faculty FTE ratios;
  3. by demand for support services per FTE student;
  4. by space occupied per FTE student.
- Duplication. Whether or not the program is available at another institution within the state or in another state through reciprocity agreement is an important criterion for identifying university programs for review.

Once a program has been selected for intensive review, the issue of quality becomes significant. While many aspects of evaluation for quality are, of necessity, qualitative, there are some quantitative elements that are directly related to quality. Such criteria as total research funding available per FTE faculty provide insight into the level of activity and, thus, the environment for graduate theses. In areas in which research grants are less available, the publications record of the faculty provides insight concerning the level of scholarly activity. In the final analysis, however, peer judgment by competent external consultants is the most effective way to seek evaluation of the quality of the program and whether, despite negative indications, it deserves special consideration for retention.

SUMMARY

To assure the public that accountability exists for the resources made available to the Arizona public universities, a continual review of the procedures used to initiate new programs and to assure the efficiency of existing ones should be required by the policies of the Board of Regents. In addition to a qualitatively oriented decennial review conducted by the university, the Regents' staff should, on a three- to five-year cycle, examine various productivity and efficiency indicators and initiate, with the cooperation of the affected universities, a survey of programs judged to require such review. Particular attention should be given to programs of low productivity that are duplicated within the system.

APPENDIX

The information in this Appendix centers only on the degrees awarded in various program areas. No attempt is made to determine either quality or program effectiveness. Other criteria that should be considered when looking at issues of program duplication are cited in the text.

Studies pertaining to program duplication undertaken at public institutions in other states were reviewed, especially those in Montana and Colorado. The Montana study followed guidelines established in a study commissioned by the Ohio Board of Regents (1,2,3).

The Ohio study was concerned with the state's needs for higher educational services, statewide employment needs and opportunities, program conformance to institutional missions, geographical access and program costs. It defined duplication as "two or more institutions offering the same program in a limited geographical area and to a limited

clientele." It stated, "Perhaps no state-level review objective is more troublesome than that of the avoidance of duplication."
The concern that high-cost programs with low enrollments were being offered by more than one state-supported institution led to the Montana study.

The Colorado Commission on Higher Education undertook an extensive program review beginning in 1987 with the following objectives:

1) to phase out degree programs that are unnecessarily duplicative;

2) to phase out degree programs that produce few graduates and are less than vital to fulfilling the state goals of quality, access and diversity;

3) to phase out degree programs that are peripheral to the role and mission of the institution; and

4) to retain degree programs that provide the only means of assuring geographic access or that satisfy a demonstrable educational need of the institution's service area that cannot be met by other means.

The criteria applied in Colorado were:

whether the programs are duplicated in the public higher education system;

whether they are efficient in producing graduates; whether they are central to the institution's role and mission;

whether they are essential to other program offerings at the institution;

whether they are the only means of assuring geographical access; whether they serve a demonstrable educational need of the service area that cannot be met by other means; and whether they are vital to fulfilling state goals of quality, access, and diversity.

In Cycle 1 of the review in Colorado, 424 programs areas were examined and of these 64 were discontinued. In Cycle 2, of 330 program areas examined, 15 were discontinued. The recommendations from the Cycle 3 study of 321 program areas were to be acted upon at the June 1988 meeting of the Commission.

Based on the experiences of these studies, we chose the following numbers as standards for reviewing programs at the Arizona universities. These numbers cannot be viewed as absolutes. They serve as reasonable benchmarks to determine where unnecessary duplication might exist.

Type of Degree Program	Number of Degrees Granted
Bachelor's	
Duplicated programs	10
Non-duplicated programs	5
Master's	
Duplicated programs	5
Non-duplicated programs	3
Doctorate	
Duplicated programs	2
Non-duplicated programs	1

The degrees awarded in 1987 at all three institutions were reviewed for their adherence to these standards. The results are shown in Tables 1 through 6.

The Board of Regents' Academic Degree Program Inventory and Planning Document was the source of current degrees offered and planning authorities granted, and the degree figures cited were obtained from records maintained in the Board of Regents' Office.

Table 1 (Bachelor's Degrees in Duplicated Programs) shows several program areas that, based on degrees granted in 1987, warrant review.

TABLE 1

Bachelor's Degrees Duplicated Programs, 1987

UA	# Deg.	ASU	# Deg.	NAU	# Deg.
Med Tech	9	Med Tech	10	Med Tech	0
German	6	German	6		
Italian	4.5	Italian			
Russian	9	Russian	18		
Physics	10.5	Physics	15	Physics	2
Philosophy	5.4	Philosophy	6	Philosophy	2
Religious Studies	9	Religious Studies	3	Religious Studies	0
Earth Science	3			Earth Science	6
Geography	4	Geography	34	Geography	9
Music Ed.	9			Music Ed.	7
Music	3	Music	6	Music	4
Spec. Ed.	.5	Spec. Ed.	59	Spec. Ed. dual	
Dance	6	Dance	12		
		Botany	5	Botany	2
Geosci	26	Geology	10	Geology	12
		Physical Therapy	6	Physical Therapy	22
Health Ed.	6			Health Ed.	1
French	12.5	French	19	French	1
Spanish	27.5	Spanish	32	Spanish	3
		Zoology	18	Zoology	10
		Hum & Soc Sci (Interdis)	1	Human & SocSci	2 (Interdis)
Anthropology	36	Anthropology	15	Anthropology	8
Economics	30.5	Economics	97	Economics	3
		Theatre	20	Theatre	4
Art History	11			Art History	2
Matls Sci & Engr	2	Matls Sci & Engr	1		
Genl Home Ec	2	Genl Home Ec	118	Genl Home Ec	19
Cons. Serv. Food	3			Food Serv Mgr	1

It is helpful to look at degree figures from earlier years to note whether a program is experiencing a one-year decline or whether an enrollment pattern can be seen. In the case of Italian at the UA, the degrees granted might represent a renewed interest; 2.5 degrees were granted in 1983, none in 1984 or 1985, but then 4 in 1986 and 4.5 in 1987. At ASU, only 1 degree in Italian was presented in 1986 and then none in 1987. General Home Economics, with only 2 degrees at UA, would appear to be declining; there were 6 degrees in 1983, none in 1984 and 1985, and 3 in 1986.

While Earth Sciences at NAU appears low for 1987, in 1986 the department awarded 11 degrees. At UA, however, the 1986 figure was 2.

In Table 2 (Bachelor's Degrees in Non-duplicated Programs), one notes that only 1 degree was granted at UA in Entomology; in 1983, 3 degrees was given, there were none in 1984 and 1985, and there were 2 in 1986. Engineering Science at ASU has been relatively constant during the past five years, with 1 degree in 1983, 2 in 1984 and 1985, 1 in 1986, and 2 in 1987. Table 3 gives the figures for Master's degrees in duplicated programs.

Although only 1 degree was awarded in German at both UA and ASU, in 1986, there were 6 degrees at UA and 2 at ASU. There were only 2 degrees in Spanish at UA but in 1986 there were 11. Some critical areas such as Chemistry and Physics whose lower-division courses draw large enrollments do not award many Master's degrees. NAU has not awarded a Master's degree in Chemistry since 1984; at ASU, there was 1 degree in Physics in 1986 and 3 in 1987. In Philosophy, ASU awarded 1 degree in 1983, none in 1984, 1 in 1985, none in 1986 and 1987.

TABLE 2

Bachelor's Degrees Non-Duplicated Programs, 1987

UA	# Deg.	ASU	# Deg.	NAU	# Deg.
Irrigation	2	Engr Sci	2		
Bio engineering	6				
Agr. Comm.	2	Hous. & Urban Dev.	0	Voc. Indus. Educ.	5
Agric.	5				
Wildlife & Fish	1			Math Sci (Appl)	4
Plant Sci.	5				
Environ. Sci	2				
Range Mgr.	4	Asian Lang.	2*	Public Admin.	5
Soil & Water Sci.	2				
Public Planning	3				
Nat. Res. Res.	1	Choral	3	Intl. Affairs	3
Regional Dev.	3				
Food Serv. Mgr.	1				
Drama Educ	2				
Agr. Engr.	3				
Met. Engr.	4				
Mining Engr.	3				
Engr. Math	4				
Cons. Study & HomeMgr.	1				
Extended Engl.	2				
Classics	.5				
Linguistics	5				
Entomology	1				
Greek	2.5				
Atmos Sci	2				
Hyrology	5				
Dramatic Theory	3				
Home Ec Educ	4				

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* Asian Languages at ASU includes Chinese and Japanese. At UA, these languages are included in the offerings of the Department of Oriental Studies. In 1987, 18 Bachelor's degrees were awarded at UA in Oriental Studies. There is no breakdown to show how many of these degrees were in Chinese and Japanese languages.

The figures in Table 4 (Master's Degrees in Non-duplicated Programs) are low for Materials Science and Engineering, but this is a new program and its vital place in the Materials Science research at UA should bring these numbers up. The output of the Statistics program at UA is low (1 degree in 1983, 1 in 1986 and 2 in 1987; ASU has been given authority to plan a degree in this area. Degree figures for School Psychology (NAU) have been low: none in 1986 and 2 in 1987. Likewise, Social and Philosophical Foundations at ASU gave no Master's degrees in either 1985 or 1986, and only 1 in 1987. Engineering Mechanics at UA, with no Master's degrees granted in 1987, gave only 1 in 1984, 1985 and 1986.

Doctoral degree figures are reviewed in Tables 5 and 6. Table 5 shows that no doctorates were awarded in Spanish in

1987 at either UA or ASU. In 1986, UA gave 3 and ASU gave 1.
Although the Geology program at ASU awarded only 2 Ph.D.'s in 1987, in 1985 there were 6 and in 1986, 5.

Table 6 shows no doctoral degrees at ASU in Educational Technology, but there were 5 in 1983, 3 in 1984, 2 in 1985 and 5 in 1986. Although UA is a world-class astronomy center, its output of doctorates in this discipline is small: only 1 Ph.D. was awarded in 1987, with 3 in 1985 and 1986.

TABLE 3

Master's Degree Duplicated Programs, 1987

UA	# Deg.	ASU	# Deg.	NAU	# Deg.
German	1	German	1		
Architecture	1	Architecture	21		
French	3	French	2		
Spanish	2	Spanish	4		
Music Ed.	2	Music Ed.	8		
Chemistry	9	Chemistry	4	Chemistry	2
Physics	7	Physics	3		
Political Science	6	Political Science	2	Political Science	1
Sociology	5	Sociology	3	Sociology	2
Microbiology	5	Microbiology	0	Microbiology	0
Math	7	Math	2	Math	10
Economics	6	Economics	4		
Geography	8	Geography	3		
Educ Media	11	Educ Media	3		
Biling/Bicult	18	Bilingual/Crosscult	3		
Anthropology	16	Anthropology	11	Anthropology	4
History	8	History	8	History	4
Educ Psych	0	Ed Psych	10		
Publ Admin	5	Public Admin	27	Public Admin	3
Comm	2	Comm	12		
Chem Eng	8	Chem Eng	5		
Spch & Hearing	30	Comm Disorders	4	Spch Path	11
Philosophy	7	Philosophy	0		
Music Composition	1			Music Composition	0

TABLE 4

Master's Degree Non-Duplicated Programs, 1987

UA	# Deg.	ASU	# Deg.	NAU	# Deg.
Animal Physiol	1	Environ. Res. in Agr.	2	School Psych.	2
Fdns. of Educ.	1	Instrumental Music	1		
AerospaceEngr.	2	Soc&PhilFdns	1		
Agr. Engr.	1	Recreation	3		
Engr. Mech.	0	Theatre	3		
Anatomy	1	Theory & Comp	3		
Classics	1	School Library Sci	0		
Plant Path.	2				
Entomology	2				
Appl.Math.	2				
Statistics	2	Statistics*			
Matl Sci. & Engr.	1				
Water Res Admin.	1				
Art History	2				
Music Theory	1				
Range Mgt.	2				
Fisheries Sci.	0				
RNR Studies	1				
Dairy Sci.	0				
Plant Protection	3				
Landscape Arch.	3				
Marketing	3				
Ag. Educ.	3				
Mining Engr.	3				
Pharm. Sci.	2				
Genetics	3				
Pharmacy	3				
Linguistics	2				
Home Ec Educ	3				

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* Planning Authority Granted

TABLE 5

Doctoral Degrees Duplicated Programs, 1987

UA	# Deg.	ASU	# Deg.	NAU	# Deg.
Comp. Sci	1	Comp.Sci	1		
Ed. Psych.	1	Ed.Psych.	5	Ed.Psych.	9
Chem. Engr.	1	Chem.Engr.	2		
Spanish	0	Spanish	0		
History	0	History	2		
Spec Ed	3	Spec Ed	1		
Poli Sci	5	PoliSci	0		
Civil Engr	10	CivilEngr	1		
Sociology	2	Sociology	2		
Math	2	Math	0		
Geo sci	8	Geol	2	Geology	*
Botany	0	Botany	2	Botany	0

* Planning Authority Granted

TABLE 6

Doctoral Degrees Non-Duplicated Programs, 1987

UA	# Deg.	ASU	# Deg.	NAU	# Deg.
Animal Physiol	1	EngrSci	1		
Physiology	1	EducTech	0		
Plant Path.	0	CounselorEduc	1		
Water Res. Admin	1				
Philosophy	0				
Wildlife & Fish	1				
Oriental Studies	1				
Astronomy	1				
Range Mgr	1				
Music Ed	1				
Mining Engr	0				
Spch Comm	1				
Music Ed	1				
Music Theory	1				

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ADVANCED PLACEMENT: INCREASING EFFICIENCY IN HIGH SCHOOL - UNIVERSITY ARTICULATION

ROBERT MACVICAR

For many years it has been recognized that not all students progress through their educational program at equivalent rates. Generally, however, state policy and the desires both of students and their families have favored the practice of completing a full four years of high school attendance. For the more able and more dedicated component of the high school classes, the opportunity to move to higher levels of study has proven to be appropriate to maintain the challenging intellectual environment that this group needs. Hence, at graduation from high school, such students will have completed a segment of the studies normally found at the collegiate level.

It is an obvious efficiency if the accepting university recognizes their attainment by not requiring the student to repeat a subject already mastered and granting credit for it toward the requirements for the baccalaureate degree. The public universities of Arizona recognize previously attained academic achievement in four ways:

- The Advanced Placement Program of the College Board.

  This program, sponsored by the College Board, provides course descriptions and professional consultants to assist high schools in establishing college-level courses. The program, for a fee, administers and grades a culminating examination and provides the results to the student's prospective college. The college reviews the results and grants advanced placement with or without credit. If granted with credit the student can begin study in the respective field at a higher level and apply the credit earned by examination toward the minimum required for the degree. If credit is withheld but advanced placement awarded, only the former privilege is granted. Taking an advanced placement course in high school does not guarantee that college credit or advanced placement will be awarded by the university of first attendance.

- College Level Examination Program.

  The examinations offered by this program, which is also sponsored by

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the College Board, were designated to offer students a means of obtaining college credit for competencies acquired by formal courses, by self study, or from experience.

General examinations are offered in

(1) English Composition;

(2) Humanities;

(3) Mathematics;

(4) Natural Sciences; and

(5) Social Sciences - History.

Subject examinations are offered in over thirty areas and provide for from three to sixteen credits.

- Proficiency examinations.

  These examinations are offered by the respective universities and are designed and graded by the faculty of the department offering the course. No credit is offered but successful completion allows the student to bypass prerequisites and enroll in advanced-level courses in the area in which proficiency is demonstrated.

- Department examination for credit and/or grade.

  All three universities provide the opportunity to "challenge" a course both for credit and a letter grade by taking a special examination. Certain courses are designated as eligible for such examinations but departments are authorized to develop examinations for other courses. The examinations are comprehensive in scope and are usually prepared by a faculty member who regularly teaches the course.

Arizona has participated in the advanced placement program of the College Board on a limited basis for many years. By 1974, however, only 285 students at 24 schools were participating and 337 examinations were taken. By the end of 1988 the College Board estimates that 92 schools will be participating, 2560 students involved and 3260 examinations taken. The growth in Arizona in all three categories of measurement of participation is presented in Table I.

Table I

Comparison of Arizona and National Participation in College Board Advanced Placement Program - 1974-1987

	1974		1987		% Increase	
	AZ	NAT'L	AZ	NAT'L	AZ	NAT'L
Schools	24	3,498	85	7,776	254	122
Students	285	65,635	2,266	262,081	695	299
Examinations	337	85,786	2,885	369,207	756	330

It can be readily seen that Arizona has increased its participation more rapidly during this period than the nation as a whole. There has been a significant increase both nationally and in Arizona during a period in which the number of students eligible to participate has not increased significantly and in many states has declined during the period. In 1987, 1956 students were eligible to take examinations in 24 different subjects. A total of 2885 examinations were taken and 1904 qualified for grades of 3, 4, and 5. These scores at most colleges and universities qualify for college credit. If one assumes an average of 4 credits per examination, a total of 254 FTE student years of credit were earned by the students. Assuming attendance at a public university in Arizona, this equates to approximately $4,500,000. Since many students attend independent institutions with higher tuition, the actual foregone costs of this effort on the part of schools, students and universities has an even greater value.

The potential saving is obviously much greater since ASU and NAU permit 30 credits to be earned by all types of examinations and UA 60 credits. It is not unusual for highly motivated students to qualify for 16 credits at entrance to the university, thus reducing the cost of attendance to the completion of the baccalaureate by 12.7 percent. If the full potential value of this program is to be achieved, however, efforts will be needed to:

- Expand the number of schools participating in the program
- Expand the number of advanced placement classes offered in those schools that participate
- Encourage students who qualify for entry into these classes to enroll and to successfully complete them
- Encourage students who successfully complete the courses and are likely to achieve an acceptable score on College Board examinations to take them
- Encourage students to take advantage of credit earned or proficiency demonstrated on entering their collegiate programs by moving on to higher level courses
- Encourage the universities and colleges of Arizona to emphasize the advantages of admission with advanced standing and develop appropriate interaction with the high schools of the state to support the program
- Encourage the three public universities to collectively consider their policies on credit or proficiency by examination to permit a more uniform posture to the secondary schools
- Encourage the three public universities to make students more aware of the CLEP program and of credit or proficiency locally prepared examinations

Currently most of the urban high schools of the Phoenix and Tucson metropolitan areas are participating in the Advanced Placement Program of the College Board and are therefore familiar with the benefits conferred both to the schools and the junior and senior students who are eligible to participate. There is, however, wide variation in the degree to which students participate. Twenty-three public high schools outside these two metropolitan areas were involved in the 1986-87 year. The College Board estimates that for 1987-88 an additional 24 schools were added. It is highly likely that many of these are the larger schools outside the Phoenix and Tucson areas.

The creation of a statewide telecommunication network capable of providing services to the schools would permit, further expansion to the remainder of the public high schools of the state.

A total of 27 different courses in 14 different disciplines were offered through the Advanced Placement Program in 1987-88. Of these, all but four (Art Studio/Drawing; Computer Science, level AB; European History; and Latin) are available in several Arizona high schools. The most popular courses are American History, English Literature and Composition, and Mathematics/Calculus AB.

A number of large high schools have relatively limited offerings and most of the high schools of medium size have very limited participation in the courses they do offer. There is, therefore, a very real opportunity to increase both the range of courses offered and the number of students who choose to participate. The largest number of students in a program in the public sector is 120 at Mountain View High School in Mesa, a participation rate of 14 percent of the graduates. If this level of participation could be achieved throughout the state, there would be very significant economy achieved. There seems to be no obvious difference in the potential at Mountain View and many other suburban high schools that have far less participation by students. What is needed is enthusiastic support at the level of the local Board of Education, the district and school administration.

Some students take advanced standing courses, either in the program of the College Board or others, but do not take the necessary examinations to demonstrate proficiency and earn college credit. There is a substantial fee involved for the Advanced Standing Program of the College Board (currently $53.00), for the CLEP program ($35.00 per examination). For credit by examination, costs vary among the three universities - - $7.50 per credit hour at ASU, $30.00 at NAU, and $21.00 at UA. While relative to the total cost of an equivalent amount of credit earned by class attendance, these charges are, nonetheless, a barrier to participation by students from low-income families. If the state or districts had subsidized the cost of the Advanced Placement examination in 1987, the cost would have been $133,500. This is a small fraction of the cost of state subsidy for an equivalent amount of college credit at one of the three public universities.

Not all students who participate in the Advanced Placement Program attend collegiate institutions in Arizona. However, in 1986-87 1400 students from Arizona asked that their Advanced Placement Test Scores be submitted to in-state institutions, 1307 to the three public universities. Records of the universities do not permit an evaluation of the number of students who received credit or the amount. Participation by students in obtaining credit or demonstrating proficiency after enrollment is likewise not available from the current records but anecdotal evidence suggests that the number is relatively small. The Testing Service at ASU estimates that approximately 200 students a year take tests at their center and that a majority of them ask to have their scores sent to other colleges. The University of Arizona CLEP testing center reported that in the past year 236 persons took tests at that center. Most of the students were students at the University of Arizona. Obviously not all persons taking the examinations achieve sufficiently high scores to earn credit. Nonetheless, the CLEP program is readily available throughout the state and offers an opportunity for able and aggressive students to accelerate their postsecondary education.

A more aggressive effort on the part of Arizona's colleges and universities to promote the use of the Advanced Placement Program of the College Board, the College Level Examination

632

Program and institutionally developed tests would increase the awareness of the opportunities to accelerate the completion of the baccalaureate degree. To the degree that students do so, they reduce the costs to themselves and their families and increase the efficiency of the institutions they attend, particularly as freshmen.

RECOMMENDATIONS

The Arizona Board of Regents should include references to achieving college credit and/or recognition of proficiency in materials prepared by them for high school students considering attending one of the universities of the system.

The three universities should seek to expand the use of the opportunities offered by advanced standing classes in secondary schools and examinations offered by the universities to establish course credit or proficiency. In publications aimed at prospective students, appropriate references should be made to the recognition of advanced standing or honors sections of high school courses in determining eligibility for admissions as freshmen.

ACADEMIC DEGREE PROGRAM DUPLICATION

COUNCIL OF PRESIDENTS

CURRENT BOARD POLICIES

MISSION AND SCOPE STATEMENTS

The Arizona University System Mission and Scope Statements adopted in 1980 include the following language regarding duplication:

"In a number of respects, Arizona's public universities are now more alike than different. This is a necessary result of their designations as universities and the roles which the state's educational climate mandates for them. Each institution accepts a sizeable freshman class and each receives a significant number of transfers from the community college system. The heart of the undergraduate program in each university is rooted in the liberal arts disciplines. Each university can support individual academic departments of sufficient size that graduate work, at least to the masters level, becomes a logical and supportable function integral to the departments. Each institution has developed professional programs of reasonable size and defensible academic prowess in such areas as engineering and nursing.

Each university is authorized to award doctoral degrees, in at least some areas, and even the smallest of the three existing universities is large enough to be classified as a major institution by national norms.

At the outset, it must be understood that these common characteristics of the universities cannot be greatly changed without radically altering their structures and affecting their ability to serve their present constituencies. It is highly probable that any attempt to remove the basic commonalities of these institutions would be counter-productive in terms of dollar savings or institutional efficiency. However, the existence of certain basic elements that are common to all institutions appropriately described as universities does not alter the fact that unique roles may be assigned to institutions of higher education. It is therefore, understood that as basic parameters for the mission and scope statements:

A. Each university shall have a distinctive mission and scope. The universities cannot expect to be identical or duplicative of each other's total missions and functions.

B. No university can expect to offer all programs in all subject areas at all levels."

POLICY MANUAL

The Board's Policy Manual includes the following provisions regarding duplication in Section 2-203, Academic Degree Program Planning and Implementation: "The Board will consider the following criteria in reviewing a request for planning authorization for a new degree program that duplicates a degree program offered by another public university in Arizona. It is not necessary for a degree program to meet all of the criteria. However, the Board expects substantial justification for all requests for authorization to begin planning a new program that duplicates a program offered by another Arizona public university.

a. There is a long-term student demand for the program that cannot be met satisfactorily by the existing program.

b. The program would attract a large number of nontraditional, older, part-time students who are place-bound and who cannot move to the community in which the university offering the program is located.

c. The program is a basic academic subject normally taught in most universities.

d. The university currently offering the program cannot deliver the program off campus because of limited resources or because of the need for specialized equipment or library resources.

e. The establishment of the program will not adversely affect the existing program.

f. The resources necessary for the program such as courses, faculty, equipment, and library resources are already available as part of an existing program and the incremental costs for implementing the program are negligible."

An additional policy related to duplication is found in Section 2-208 B, Systemwide Program Review:

"1. Certain duplicated programs may be flagged for systemwide review based upon significant deviation from regional or national norms or other indicators.

2. The Academic Affairs Council will request each university to prepare a list of acceptable outside consultants. Each university may request the removal, for cause, of any number of names from the combined lists. The Regents will select the consultants from the list of names acceptable to all universities.

3. Data and other information compiled by the universities in an agreed upon format will be sent to the consultants for review prior to their visit to each campus.

4. The consultants will be asked to comment upon the quality of the program, resources available to the program, outcomes of the program, program costs, and other factors.

5. Each university will have an opportunity to review the portion of the consultants' report which bears directly upon that institution and to make comments about the report.

6. The consultants' final report and the comments from the universities will be reviewed by the Academic Affairs Council for consideration by the Academic Affairs Committee of the Board.

7. Funds required for systemwide academic program review will be separately budgeted by the Board."

These three provisions from the basic governance documents of the Arizona University System reflect the current

Board position on the issue of duplication.

During the years since some of the provisions were adopted, the profiles of the universities have changed. Some of the provisions are still clearly appropriate, but others should be re-examined in the light of the changing programs and priorities, changing state needs, and un-met demographic, economic, and social projections. Additional information that may be useful in a review of this matter is presented below.

NECESSARY VERSUS UNNECESSARY DUPLICATION

The Mission and Scope Statements very clearly indicate that a substantial amount of duplication is necessary and desirable in the three Arizona universities. However, both the Mission and Scope Statements and the Board Policies emphasize that each university should have a distinctive mission and that no university can expect to offer programs in all subject areas at all levels. All general purpose colleges and universities must have a basic core of undergraduate liberal arts and sciences, fine arts, and humanities programs such as English, mathematics, biology, physics, history, music, art, psychology, etc.

Another set of undergraduate and masters programs could be classified as acceptable. They are not absolutely essential to a college or university but they are acceptable and desirable because there is a significant student demand for the program. This category may include bachelors and masters level programs in business, engineering, and education. Duplication is usually not an issue for these programs unless there is a major financial crisis that requires program elimination.

A third set of programs includes those that are highly specialized, very expensive, usually at the doctoral level, and serve a small number of students. These could be candidates for possible unnecessary duplication.

QUALITY VERSUS GEOGRAPHICAL ACCESS

If financial resources for higher education in Arizona were virtually unlimited, the state would be best served by having a university system that provides geographical access to a full range of degree programs at all levels for a large percentage of its population and also provides very high quality programs. However, if resources are limited, the state may have to choose between quality and geographical access.

A university may use its resources to develop a limited number of exceptionally high quality graduate degree programs or it may offer a broad range of modestly funded graduate programs that meet minimum to mid-range quality standards. If the former option is selected, some students will be required to relocate in order to pursue certain graduate degrees, but the degrees earned will have a greater market value for the recipient. If the latter option is selected, access is diminished because some students may not be able to relocate to the community in which the university offering the desired program is located.

ECONOMIC DEVELOPMENT

The importance of high quality higher education institutions to regional economic development has become increasingly clear as the high tech/information era has emerged. The importance of a diverse economic base to a region has also become more evident during recent years as the states with economies highly dependent on the price of oil have experienced radical swings in their economic health. Consequently, another consideration in examining the duplication issue is the importance of a particular program to the economic development of the geographical region served by the university.

ISSUES FOR CONSIDERATION BY THE EEC TASK FORCE

It is clear that the issue of program duplication has implications for efficiency, excellence, and competitiveness. Therefore, the EEC Task Force and its staff should consider addressing the following issues:

1. What assumptions about the availability of state resources should guide university and Board decisions about academic program development during the next planning period?

2. What strategy for program development would best serve the state's interest in providing educational opportunities, in promoting economic development, and in improving the quality of life for Arizona residents?

3. What changes are needed in current Board and/or university policies and procedures related to academic program duplication?

4. Should any existing programs be reviewed for possible unnecessary duplication? If yes, how should those programs be identified?

FUNDING AND RESOURCE UTILIZATION

AN OVERVIEW OF THE STATE OF ARIZONA, ARIZONA BOARD OF REGENTS, AND UNIVERSITY STATE OPERATING BUDGET REQUEST PROCESSES INCLUDING A TWENTY FIVE YEAR STATE FUNDING, PRODUCTIVITY AND PERFORMANCE OUTPUT HISTORY OF UNIVERSITY OF ARIZONA MAIN CAMPUS, ARIZONA STATE UNIVERSITY MAIN CAMPUS AND NORTHERN ARIZONA UNIVERSITY

ALAN W. CARROLL

STATE OF ARIZONA BUDGET PROCESS

"The governor shall prescribe the forms to be used by the budget units in submitting their budget estimates and requests for appropriations...
and shall prepare necessary instructions for guidance of officials in preparing such budget estimates and requests." [ARS 35-112.]

According to the Executive Budget Office (EBO), the forms, "provide a means for each state agency to submit a budget request for the amount of money and positions which will be needed to perform those functions that it is authorized or required by law to perform. The development of a budget request represents the best planning efforts of an agency and is not simply an inflated version of last year's budget". (State of Arizona Executive Budget Schedules and Instruction Manual, Fiscal Year 1988.)

The EBO requires that state agencies (including the Arizona Board of Regents and the universities) submit incremental budget requests in program budgeting formats. The incremental requests identify marginal "base budget" increases (or decreases) needed to fund current service levels during the next fiscal year, and to fund new and/or expanded programs. The program budget format identifies and defines a state agency's major functions and activities. A state agency's state budget request includes both the estimated needs for a "continuation budget", and for new and expanded programs.

Alan W. Carroll has served as Budget Director at Arizona State University for ten years. He also serves as a member of various Board of Regents and tri-university councils and task forces. Prior to joining the ASU administration, Mr. Carroll spent seven years as a budget analyst with the Executive Budget Office and the Joint Legislative Budget Committee at the State of Arizona.

CONTINUATION BUDGET REQUESTS

State agencies refer to estimates of state operating budget funding levels required to maintain currently authorized programs during the next fiscal year as "continuation", or "current services", budget requests.

The universities include student enrollment driven formula funding requests within their continuation budgets. The formula, called "22 to 1", provides one additional (or one less) faculty position for every increase (or decrease) of 22 full time equivalent students. The formula also provides a .75 staff position and operations funding requested to support each new faculty position.

NEW OR EXPANDED PROGRAMS

The state operating budget requests also include estimates of the personnel needs and funding levels required to support new or expanded programs. The universities usually identify these additional funding requests as "decision packages", while EBO and other state agencies usually refer to them as "policy issues", or "program changes".

PROGRAM BUDGETS

The state operating budget requests also provide the format for a detailed review and analysis of an agency's programmatic elements (services, major functions and activities). The budget programs also provide the legislature with an annual "basis for appropriation" for the universities. While the legislature usually appropriates funds separately to each program within a state agency, ABOR, and each university receives its funding for the total budget, rather than for each budget program within the total. The annual appropriations act, therefore, provides ABOR and the universities with a great degree of fiscal flexibility not afforded to many state agencies.

ABOR BUDGET

The ABOR state budget request consists of two programs: (1) Regents, Staff and Western Interstate Commission for Higher Education (WICHE) and; (2) Arizona Postsecondary Education Commission. These two programs provided the following 1987-1988 ABOR "basis for appropriation" (prior to a 1988 legislative expropriation).

FTE Positions	34.75
Personal Services [salaries and wages]	$ 1,281,400
Employee Related Expenditures [benefits]	238,300
Operations [travel, supplies, equipment, etc.]	207,000
Operations Subtotal	$ 1,726,700
Statewide Planning [university strategic planning and cost study]	200,000
WICHE Office Expenses	59,000
WICHE Student Subsidies [support to Arizona students enrolled in health related programs outside Arizona]	1,826,200
State Student Incentive Grant (SSIG) Program [a match of federal scholarship funds for postsecondary education students demonstrating financial need]	1,143,000
Course Equivalency Guide [publishing costs]	12,100
Postsecondary Data Project [research and analysis, data collection, information dissemination related to post-secondary education opportunities in Arizona]	19,000
Total Appropriation	$ 4,986,100

UNIVERSITY BUDGETS

The university program budget requests consist of six programs: Instruction, Organized Research, Public Service, Academic Support, Student Services, and Institutional Support. The University of Arizona (UA) Main Campus, however, includes Agriculture as a seventh program. The UA College of Medicine request includes only the Instruction, Academic Support and Institutional Support programs. Arizona State University (ASU) has presented its West Campus budget request as a single program during the formative stages of that campus.

UA MAIN CAMPUS

FTE Positions	4,868.2
Personal Services	$122,662,800
Employee Related Expenditures	20,941,500
All Other Operating Expenditures	39,719,800
Agriculture	33,025,400
Total Operating Budget [State Expenditure Authority]	$216,349,500
Collections [mainly tuition and fee revenue]	(38,020,200)
Other Receipts	(4,599,500)
Balances Forward [from prior year]	-0-
Total General Fund Appropriation	$173,729,800
Funded FTE Student Enrollment [22:1 formula]	25,860.0

UA COLLEGE OF MEDICINE

FTE Positions	582.7
Personal Services	$ 22,251,100
Employee Related Expenditures	3,589,900
All Other Operating Expenditures	7,027,000
Clinical Teaching Support [cost of hospital training for clinical assistants, medical students, residents and interns - contracted services]	8,849,900
Total Operating Budget	$ 41,717,900
Collections	(1,565,300)
Other Receipts	(50,000)
Balances Forward	-0-
Total General Fund Appropriation	$ 40,102,600

ASU MAIN CAMPUS

FTE Positions	4,471.3
Personal Services	$132,172,800
Employee Related Expenditures	23,168,700
All Other Operating Expenditures	43,803,300
Total Operating Budget	$199,144,800
Collections	(44,604,200)
Other Receipts	(1,177,800)
Balances Forward	-0-
Total General Fund Appropriation	$153,362,800
Funded FTE Student Enrollment	30,636.0

ASU WEST CAMPUS

FTE Positions	217.9
Personal Services	$ 5,298,500
Employee Related Expenditures	1,008,800
All Other Operating Expenditure	1,906,400
Sundome Programs	250,000
Total Operating Budget	$ 8,463,700
Collections	(1,000,000)
Other Receipt	-0-
Balances Forward	-0-
Total General Fund Appropriation	$ 7,463,700
Funded FTE Student Enrollment	679.0

NORTHERN ARIZONA UNIVERSITY (NAU)

FTE Positions	1,530.0
Personal Services	$ 42,928,900
Employee Related Expenditures	7,903,400
All Other Operating Expenditures	16,071,000
Total Operating Budget	$ 66,903,300
Collections	(11,109,800)
Other Receipts	(490,000)
Balances Forward	(100,000)
Total General Fund Appropriation	$ 55,203,500
Funded FTE Student Enrollment	10,874.0

INSTRUCTION

Instruction includes teaching, departmental research (basic research programs and research directed toward the transfer of knowledge in a classroom setting - not organized research activities) and faculty public service (assisting and transfering knowledge to the general public). This program includes the colleges and schools within each university.

ORGANIZED RESEARCH

Organized Research consists of research activities conducted within formally organized and ABOR approved research divisions, bureaus, institutes, and experimental stations. These units direct their principal activities toward the acquisition and application of new knowledge especially beneficial to the state and the nation, as opposed to the basic research programs, and research directed by instructional departments toward the transfer of knowledge within the classroom.

PUBLIC SERVICE

Public Service contains university activities primarily directed toward serving the general public, but excludes faculty public service. Program activities include the university television and radio stations, et. al.

ACADEMIC SUPPORT

Academic Support units primarily support the Instruction, Organized Research, and Public Service programs. Budget units within this program include libraries, museums, graduate colleges, academic vice presidents' offices, media services, academic computing services, and others.

STUDENT SERVICES

Student Services provides program activities directed toward serving students. These activities include undergraduate admissions, registration, student health services, counseling, financial aid, and others.

INSTITUTIONAL SUPPORT ACTIVITIES

Institutional Support activities support all other university programs. Institutional Support includes: the total university utilities costs; accounting, purchasing, personnel, budget, telecommunications, and alumni services; presidents', administrative and financial vice presidents' offices, and physical plant operations, among others.

AGRICULTURE

This UA Main Campus program includes the College of Agriculture, the Agricultural Experiment Station, the Cooperative Extension Service, et. al., and primarily represents the state's support of federal land grant university programs.

The ABOR Central Office and EBO staffs developed the university state budget program structure in 1973, and the universities first presented it with their 1974-1975 state budget requests. It generally conforms with the program structures designed by the National Commission of Higher Education Management Systems (NCHEMS) and WICHE. Many colleges and universities in the United States utilize one of these cost allocation structures.

These programs provided the following original 1987-1988 legislative "basis for appropriation" for each of the university budgets (prior to 1988 legislative expropriations).

STATE OPERATING BUDGET REVENUE SOURCES

The following revenue sources support the university state operating budgets (legislative expenditure authority).

COLLECTIONS

Collections consist of student registration fees (paid by all registrants) and tuition (paid by nonresident registrants only) revenue. The ABOR authorizes the universities to retain a portion of tuition and fee revenue for bonding debt service, plant projects (maintenance of buildings), a match for state building renewal funds, and some operating budgets not supported by the state. The universities deposit the balance of their tuition and fee revenue with the State Treasurer as Collections. This annual deposit averages about seventy percent of tuition and fee receipts. Collections also includes ten percent of annual summer sessions revenues, and some miscellaneous student fees (mainly late registration fee charges).

OTHER RECEIPTS

Other Receipts includes state lands trust revenue. The state receives revenue from the sale and lease of state lands dedicated to, and held in trust for the State Department of Education and the universities. The State Land Department prorates the funds to these entities in accordance with state law. The universities also reimburse the state for the funding of employer contributions to the university optional retirement plans. These state funded contributions revert when employees leave a university prior to meeting a five year vesting period.

The UA Main Campus also includes the federal land grant university agriculture program revenue in Other Receipts.

BALANCES FORWARD

The universities budget for the coming fiscal year all actual unexpended and uncommitted state operating budget balances remaining from the past fiscal year. State law exempts the universities from a requirement that state agencies revert unexpended funds at the close of a fiscal year.

GENERAL FUNDS

General funds consist of state general tax revenues.

THE UNIVERSITY STATE OPERATING BUDGET PROCESS

INTERNAL BUDGET PROCESS

The universities' internal state budget process establishes needs and priorities for current and planned programs and activities, and the funding requirements for their support, including state appropriations.

The ABOR requires the universities to identify program needs that support their ABOR approved missions and scope and current ABOR short and long range goals (e.g., improve undergraduate education, improve minority student recruitment and retention, etc.).

This process provides the framework for the universities to describe and justify to ABOR, the governor, and the legislature their current, new or expanded program plans and needs. The process also provides decision makers with the tools to rationally and equitably allocate resources in support of university plans and programs.

The state operating budget process begins approximately eighteen months prior to the fiscal year of the budget request. In January, the presidents issue decision package development guidelines to their vice presidents. These guidelines establish general university goals and objectives for the budget request year, and identify ABOR priorities within the mission and scope of each university. Colleges and departments develop their decision package requests within the parameters of the presidents' guidelines, and any additional directions from the responsible vice president.

ABOR BUDGET REQUEST GUIDELINES, REVIEW, AND APPROVALS

In June, or thirteen months before the start of the budget request fiscal year, ABOR establishes funding limits for each university's decision package requests. ABOR usually sets the decision package request limits at an equal percentage of each university's total state operating budget as of July 1. (For 1988-89, ABOR established the decision package request ceiling at ten percent of each university's 1987-88 state operating budget.)

At the same time in June, shortly after EBO issues its budget development guidelines to all state agencies, ABOR also establishes guidelines for the development of the universities continuation budget requests. The continuation budget guidelines set percentage limits for inflationary, or other increases to base budget categories, such as travel, supplies, equipment, utilities, and library materials. The ABOR guidelines usually follow the EBO guidelines, but address areas not included by EBO (such as the costs of replacing technically obsolete equipment, and the costs of various library materials), and also establish equal budget request levels for the 22:1 enrollment growth formula at each university.

Beginning with the 1987 Fall Semester, the universities calculate FTE student enrollments by dividing lower division (freshman, sophomore), upper division (junior, senior), and graduate division semester credit hours (SCH) attempted by all students by 15, 12, and 10, respectively. The divisors represent full course loads for each of the three student levels.

Before Fall 1987, the FTE enrollment calculations divided both lower and upper division SCH attempted by 15, and graduate SCH attempted by 10. The JLBC staff calculated the funded enrollments reported above in accordance with this older methodology.

The ABOR internal audit staff audits the FTE student enrollments to assure that the universities report in accordance with Board policies.

On August 1, the universities submit their decision package requests to ABOR for Central Office review and analysis. By this time, the universities have filtered them through their own extensive seven month internal review and analysis processes. In general, a univerity's internal process includes vice presidential review of the decision packages submitted from within his or her own area of responsibility. The vice presidents then delete, or submit amended or unchanged decision package requests to the university budget office. The budget office analyzes the requests before forwarding them, with recommendations, to a university budget committee composed of vice presidents and several other administrators. The committee decides which decision package requests the university will submit to ABOR, and their funding and priority levels subject to final presidential approval.

The ABOR receives the total state budget requests (continuation budget and decision packages) on August 25. The ABOR staff reviews the requests to assure compliance with ABOR guidelines, holds budget hearings for each university between August 25 and early September, and prepares recommendations for submission to the ABOR.

FINANCE COMMITTEE

The Finance Committee conducts budget hearings for each university toward the end of September, and prepares and forwards its budget recommendations for full Board approval at an October meeting.

The Finance Committee usually recommends, and ABOR usually approves, an "across the board" reduction of a couple of points from the percentage of the base budgets previously established for the decision package requests. (For 1988-1989, ABOR finally approved eight percent.) The board also approves a priority listing for each university's decision package requests, but does not establish a priority list of decision packages for the three university system.

EXECUTIVE AND LEGISLATIVE BUDGET REVIEW, ANALYSIS AND RECOMMENDATIONS

The Arizona Revised Statutes prescribe that all state agencies annually submit operating budget requests to EBO no later than October 15 (ARS 35-113). The universities usually submit their state operating budget requests on that date to both EBO and the Joint Legislative Budget Committee (JLBC) staff. Both EBO and JLBC receive copies of the August budget request submissions, and their analysts attend the hearings held by the ABOR Finance Committee.

According to ARS 35-111, "annually, not later than five days after the legislature convenes, the governor shall submit to the legislature a budget containing a complete plan of expenditures proposed to be made before the close of the ensuing fiscal year and all monies and revenues estimated to be available therefore, together with an explanation of the basis of such estimates and recommendations as to proposed legislation, if any, which he may deem necessary to provide revenues sufficient to meet such proposed expenditures."

The JLBC "consists of sixteen members, including the majority leaders of the senate and house of representatives, the chairmen of the senate and house appropriations committees, the chairman of the senate finance committee and the chairman of the house ways and means committee, five members of the senate and five members of the house of representatives who are members of their respective appropriations committees [and appointed by] the president of the senate and the speaker of the house..." (ARS 41-1271).

"The [JLBC] shall ascertain facts and make recommendations to the legislature relating to the state budget, revenues and expenditures of the state, future fiscal needs, the organization and functions of state agencies or divisions and such other matters incident to the above functions..." (ARS 41-1272).

ARS 41-1273 requires the JLBC to appoint a budget analyst to serve as staff director, and who "shall prepare for distribution an analysis of the governor's budget as soon after the budget is presented to the legislature as is possible. The analysis...shall include recommendations...for revisions in expenditures".

In reality, both EBO and JLBC staff perform independent analyses of state agency requests and submit independent recommendations to the legislature. The EBO and JLBC budget analysts visit the universities and work with ABOR Central Office staff and university personnel while developing their recommendations. Both analysts have a minimum of five months, from August 1 through December, to review and analyze the budget requests, identify issues, request additional information, and develop their recommendations for presentation to the legislature in January.

The house and senate appropriations committees expect the JLBC staff recommendations within a week or so after they receive the governor's recommendations. As a result, the legislative staff has little time, if any, to analyze the governor's recommendations.

Over the past ten years or so, neither the EBO nor the JLBC staff budget documents have addressed pertinent university budget issues, nor have they provided the legislature with much detail describing the university budget requests and their own recommendations.

LEGISLATIVE SESSION, BUDGET HEARINGS AND ANNUAL APPROPRIATIONS

The annual legislative session begins on the second Monday in January, and usually lasts until mid April or early May. Both the house and senate appropriations committees work through subcommittees to develop state agency budgets.

Each of the house and senate appropriations subcommittees assigned to the universities usually hold one or two hearings related to each university's budget request. The average budget hearing for each university normally takes from one to two hours. Obviously, the subcommittees can hear few issues and little budget detail in that amount of time.

As a result, each session the ABOR Central Office staff and university personnel must spend time informing appropriations committee members and other key legislators (usually on a one to one basis) of university budget issues and details. The EBO and JLBC budget analysts also spend time in similar meetings with legislators, but usually their perspectives on issues and budgets significantly differ from those of university personnel.

The appropriations subcommittees develop their budget recommendations for each of the universities with assistance from the JLBC analyst, and occasionally from the EBO analyst, but usually without university personnel present. The full appropriations committees of both the house and the senate subsequently approve their subcommittee's recommendations "as is", or in an amended form. The university budgets play a significant role in a process where each appropriations committee establishes a negotiating position with the other on the annual State of Arizona operating budget, also known as the "feed bill".

The appropriations committee negotiations occur during the "joint appropriations committee hearings", which normally begin in early April and last approximately two weeks. During this period, legislators, EBO and JLBC analysts and university personnel have much contact while negotiating budget changes and compromises. After both appropriations committees eliminate their fiscal differences and reach an agreement on a total state budget, the JLBC staff prepares the general appropriations bill for introduction in the House of Representatives. By custom, the bill is approved without amendment by the House of Representatives and the Senate, and forwarded to the governor, who can either sign or veto the entire bill, or exercise selective line item vetos.

A 25 YEAR STATE FUNDING, PRODUCTIVITY AND PERFORMANCE OUTPUT HISTORY

UNIVERSITY OF ARIZONA
MAIN CAMPUS
ARIZONA STATE UNIVERSITY
MAIN CAMPUS
NORTHERN ARIZONA UNIVERSITY

This section of the report deals only with ASU Main Campus, NAU, and UA Main Campus data. It excludes data related to ASU West, UA College of Medicine, and UA University Hospital, except where specifically noted in the text. Otherwise, the data become distorted when used to identify aggregate per student costs, for year to year budget comparisons, and for other budget outcomes.

The UA University Hospital, for example, became a not for profit corporation (with no state budget) in FY 1985, but in FY 1984 its state operating budget totaled $59.2 million (with only $4.5 million funded from the state general fund and the balance funded mainly from patient receipts). Also, the UA College of Medicine, with a current medical student headcount enrollment of 352 (but 785 FTE students), has a FY 1988 state operating budget of $41.7 million (over $53,000 per FTE student, while the FY 1988 cost per FTE student for ASU Main Campus, NAU, and UA Main Campus averages a little under $7,000). Furthermore, the ASU West Campus did not exist as a budget unit until FY 1985, when it had a 2,246 student headcount enrollment (but only 616 FTE students) and a state operating budget of $1.9 million. For FY 1988, ASU West, a developing campus with high fixed costs, has a state operating budget of $8.5 million, but only 922 FTE students (or over $9,000 per FTE student).

STATE OPERATING BUDGETS

The funding sources for the State Operating Budgets consist of State General Fund appropriations, Collections, Other Receipts, and Balances Forward. (Please see page 1335 for detailed descriptions of the sources).

These revenues are deposited with the State Treasurer in university operating budget accounts, and expenditures are monitored and controlled by the State Department of Administration.

Between FY 1963 and FY 1988, the

university state operating budgets grew 1,551 percent, from $29,214,200 to $482,397,600. The annual compounded (accumulated) increase of these budgets averaged 62.0 percent, while the year to year simple increase averaged 11.9 percent. [SEE TABLE I. AND FIGURE 1]

TABLE I.

STATE OPERATING BUDGETS

	(In $ 000's)					
	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly In
ASU	$10,149.6	$199,144.8	$188,995.3	1.862	74.5%	12.7%
NAU	2,390.9	66,903.3	64,512.4	2.698	107.9%	14.4%
UA	$ 16,673.7	216,349.5	199,675.8	1.198	47.9%	10.9%
TOTAL	$ 29,214.2	$482,397.6	$453,183.5	1.551	62.0%	11.9%

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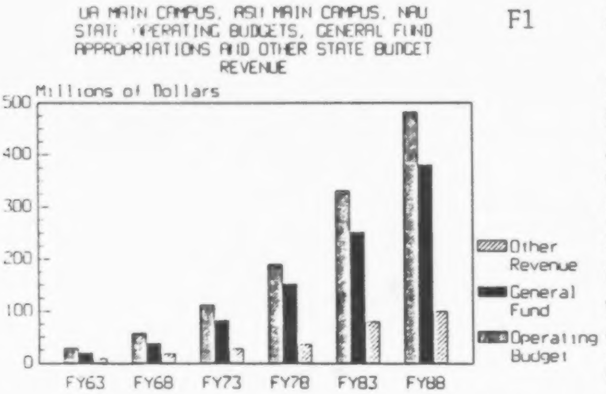

When adjusted for inflation (the Higher Education Price Index [HEPI] expressed in 1967 dollars), these budgets grew 251 percent during this 25 year period (from $34,945,200 to $122,591,500), for an annual compounded average increase of 10.0 percent. The year to year simple increase averaged 5.2 percent. The HEPI increased an average of 6.4 percent per year during this time. [SEE TABLE II.. AND FIGURE 2]

F2

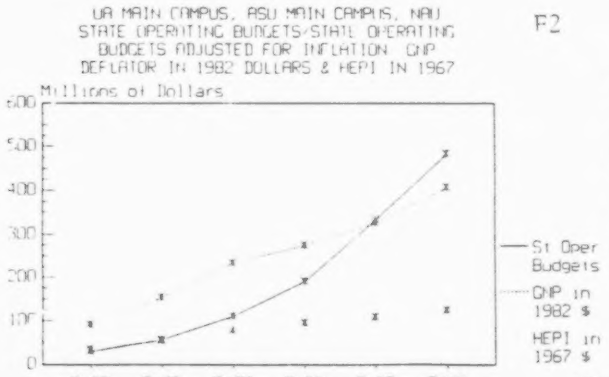

TABLE II.

STATE OPERATING BUDGETS ADJUSTED FOR INFLATION (HEPI IN 1967 DOLLARS)

	(In $ 000's)					
	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	$ 12,140.7	$ 50,608.6	$ 38,467.9	316.9	12.7%	5.6%
NAU	2,859.9	17,002.1	14,142.2	494.5	19.8%	7.8%
UA	19,944.6	54,980.8	35,036.2	175.7	7.0%	4.6%
TOTAL	$ 34,945.2	$122,591.5	$ 87,646.3	250.8	10.0%	5.2%

STATE OPERATING BUDGETS BY STATE BUDGET PROGRAM

In FY 1974, the universities first presented their state legislative budget requests in the current six program format: Instruction, Organized Research, Public Service, Academic Support, Student Services, and Institutional Support.

In FY 1982, some state legislators successfully proposed separating the Agricultural Experiment Station and the Cooperative Extension Service from the UA Organized Research and Public Service programs, respectively. The legislature then appropriated funds for these two units as line items for several years. In FY 1985, UA moved these units within a seventh budget program, Agriculture, and subsequently included the College of Agriculture, Boyce Thompson Arboretum, and University Farms. For reporting purposes, however, we have included all of these Agriculture program budget units within their original six state budget programs.

In FY 1974, the universities reported the following state operating budgets by state budget program. [SEE TABLE III., AND FIGURES 3 AND 4]

F3

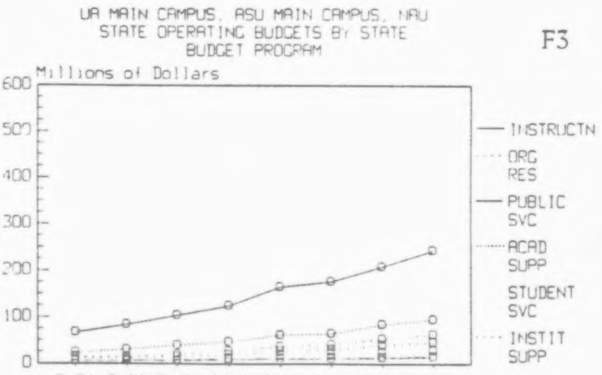

TABLE III.

FY 1974 STATE OPERATING BUDGETS BY STATE BUDGET PROGRAM (IN $ 000'S)

STATE PROGRAM	ASU	NAU	UA	TOTAL
Instruction	$ 26,912.8	$ 8,948.8	$ 30,667.9	$ 66,529.5
% of Total	57.0	55.6	50.9	53.8
Organized Research	2,515.3	887.0	8,650.1(1)	12,052.4
% of Total	5.3	5.5	14.3	9.7
Public Service	246.6	470.3	3,720.0(2)	4,436.9
% of Total	.5	2.9	6.2	3.6
Academic Support	5,885.5	973.9	5,503.6	12,363.0
% of Total	12.5	6.1	9.1	10.0
Student Services	2,406.9	716.3	2,052.8	5,176.0
% of Total	5.1	4.5	3.4	4.2
Institutional Support	9,277.2	4,089.1	9,729.7	23,096.0
% of Total	19.6	25.4	16.1	18.7
University Total	$ 47,244.3	$ 16,085.4	$60,324.1(3)	123,653.8
% of Total	100.0	100.0	100.0	100.0

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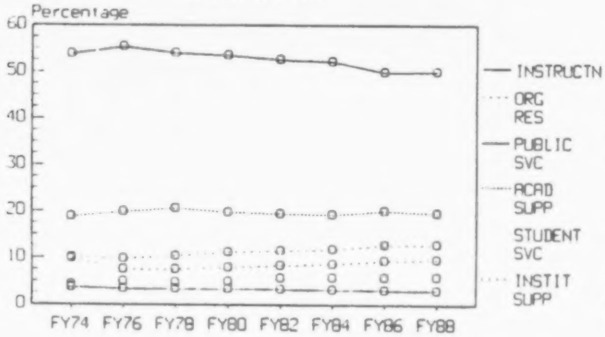
(1) Includes $5,890,500 budgeted for the Agricultural Experiment Station

(2) Includes $3,318,700 budgeted for the Cooperative Extension Service

(3) When excluding the amounts identified in footnotes (1) and (2) above for state land grant university agriculture programs, UA's program budget percentages reported above change to: Instruction - 60.0; Organized Research - 5.4; Public Service - .8; Academic Support - 10.8; Student Services - 4.0; Institutional Support - 19.0.

UA MAIN CAMPUS, ASU MAIN CAMPUS, NAU
STATE OPERATING BUDGETS BY STATE
BUDGET PROGRAM

F4



The university program budget totals as percentages of total operating budgets also change with the above noted exclusions: Instruction - 58.1, Organized Research - 5.4, Public Service - 1.0, Academic Support - 10.8, Student Services - 4.5, Institutional Support - 20.2, [SEE FIGURE 5].

In FY 1988, the universities reported the following State Operating Budgets by State Budget Program, prior to a 1988 legislative expropriation. [SEE TABLE IV., AND FIGURES 3 AND 4]

TABLE IV.

FY 1988 STATE OPERATING BUDGETS BY STATE BUDGET PROGRAM (IN $ 000'S)

State Program	ASU	NAU	UA	TOTAL
Instruction	$110,401.7	$ 33,504.4	$ 97,404.7	$241,310.8
% of Total	55.4	50.1	45.0	50.0
Organized Research	7,133.9	2,215.3	35,885.9(1)	5,235.1
% of Total	3.6	3.3	16.6	9.4
Public Service	1,761.9	777.9	11,141.1(2)	13,680.9
% of Total	.9	1.2	5.1	2.8
Academic Support	30,338.8	8,447.0	22,391.0	61,176.8
% of Total	15.2	12.6	10.3	12.7
Student Services	11,135.2	5,299.4	11,167.9	27,602.5
% of Total	5.6	7.9	5.2	5.7
Institutional Support	38,373.3	16,659.3	38,358.9	93,391.5
% of Total	19.3	24.9	17.7	19.4
University Total	$199,144.8	$ 66,903.3	$216,349.5(3)	$482,397.6
% of Total	100.0	100.0	100.0	100.0

----

(1) Includes $18,064,100 budgeted for the Agricultural Experiment Station.

(2) Includes $9,595,900 budgeted for the Cooperative Extension Service.

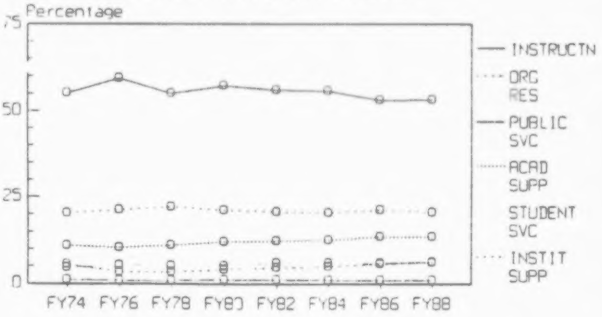
(3) When excluding the amounts identified in footnotes (1) and (2) above for state land grant university agriculture programs, UA's program budget percentages reported above change to: Instruction - 51.6; Organized Research - 9.5; Public Service - .8; Academic Support - 11.9; Student Services - 5.9; Institutional Support - 20.3.

The university program budget totals as a percentage of total operating budgets also change with the above noted exclusions: Instruction-53.1; Organized Research - 6.0; Public Service - .9; Academic Support - 13.4; Student Services - 6.1; Institutional Support - 20.5. [SEE FIGURE 5]

The university program budget totals as a percentage of total operating budgets also change with the above noted exclusions: Instruction - 53.1; Organized Research - 6.0; Public Service - .9; Academic Support - 13.4; Student Services - 6.1; Institutional Support - 20.5. [SEE FIGURE 5]

UA MAIN CAMPUS, ASU MAIN CAMPUS, NAU
STATE BUDGET PROGRAMS AS PERCENT OF
STATE OPERATING BUDGETS ADJUSTED FOR
UA LAND GRANT UNIVERSITY PROGRAMS

F5



Between FY 1974 and FY 1988, the universities' Instruction budgets grew 263 percent, while decreasing slightly as a percentage of total state operating budgets. The Instruction budgets comprised 53.8 percent of the total in FY 1974, and 50.0 percent of the total 14 years later in FY 1988, or 58.1 and 53.1 percent, respectively, when adjusting for the UA land grant university programs. Most of this percentage decrease results from increasing budgets for direct instructional support services in the Academic Support program.

Between FY 1974 and FY 1988, the universities' Organized Research budgets grew 275 percent, while remaining stable as a percentage of total state operating budgets. The universities' Organized Research budgets comprised 9.7 percent of their total operating budgets in FY 1974, and 9.4 percent of the total in FY 1988, or 5.4 and 6.0 percent, respectively, when adjusting for the UA Agricultural Experiment Station.

Between FY 1974 and FY 1988, the universities' Public Service budgets grew 208 percent, while decreasing slightly as a percentage of total state operating budgets. The Public Service budgets comprised 3.6 percent of the total in FY 1974 and 2.8 percent in FY 1988, or 1.0 and .9 percent, respectively, when adjusting for the UA Cooperative Extension Service.

Between FY 1974 and FY 1988, the universities' Academic Support budgets grew 395 percent, while increasing slightly as a percentage of total state operating budgets. The universities' Academic Support budgets comprised 10.0 percent of their total operating budgets in FY 1974 and 12.7 percent of the total in FY 1988, or 10.8 and 13.5 percent, respectively, when adjusting for the UA land grant university programs. Most of this growth results from increasing budgets for libraries and computing services, which directly support students and faculty in the Instruction and Organized Research programs.

Between FY 1974 and FY 1988, the universities' Student Services budgets grew 433 percent, while increasing slightly as a percentage of total state operating budgets. The Student Services budgets comprised 4.2 percent of the total in FY 1974, and 5.7 percent of the total in FY 1988, or 4.5 and 6.1 percent, respectively, when adjusting for the UA land grant university programs. Most of this growth results from the implementation of decision packages for expanded programs for students, including minority student recruitment and retention.

Between FY 1974 and FY 1988, the universities' Institutional Support budgets grew 304 percent, while increasing slightly as a percentage of total state operating budgets. The Institutional Support budgets comprised 18.7 percent of the total in FY 1974, and 19.4 percent of the total in FY 1988, or 20.2 and 20.5 percent, respectively, when adjusting for the UA land grant university programs. Much of this growth results from increasing university utilities costs, and the implementation of decision packages providing maintenance support for new buildings.

GENERAL FUND APPROPRIATIONS

Between FY 1963 and FY 1988, general fund appropriations to the universities grew 1,772 percent, from $20,421,900 to $382,296,100. The annual compounded increase of these budgets averaged 70.9

percent, while the annual simple increase averaged 12.6 percent. [SEE TABLE V., AND FIGURE 1]

TABLE V.

STATE GENERAL FUND APPROPRIATIONS

Avg	(In $ 000's) FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Yrly Inc
ASU	$ 7,568.9	$153,362.8	$145,793.9	1,926	77.0%	13.0%
NAU	1,857.3	55,203.5	53,346.2	2,872	114.9%	14.8%
UA	10,995.7	173,729.8	162,734.1	1,480	59.2%	11.8%
TOTAL	$ 20,421.9	$382,296.1	$361,874.2	1,772	70.9%	12.6%

When adjusted for inflation (HEPI in 1967 dollars), the general fund appropriations grew 298 percent during this 25 year period (from $24,428,200 to $97,152,700), an average annual compounded increase of 11.9 percent.

The annual simple increase averaged 5.8 percent. The HEPI increased an average of 6.4 percent per year during this time. [SEE TABLE VI.]

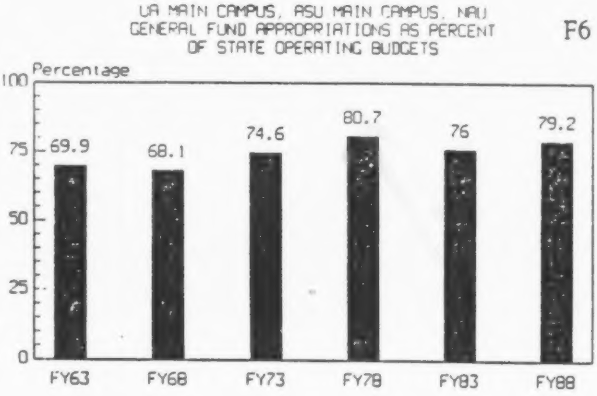
TABLE VI.

STATE GENERAL FUND APPROPRIATIONS (HEPI IN 1967 DOLLARS)

	(In $ 000's) FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	$ 9,053.7	$ 38,974.0	$ 29,920.3	330.5	13.2%	6.2%
NAU	2,221.7	14,028.8	11,807.1	531.4	21.3%	7.9%
UA	13,152.8	44,149.9	30,997.1	235.7	9.4%	5.1%
TOTAL	$ 24,428.2	$ 97,152.7	$ 72,724.5	297.7	11.9%	5.8%

Between FY 1963 and FY 1988, the university general fund appropriations, expressed as a percentage of the state operating budgets, have varied from a FY 1967 low of 65.5 percent to a FY 1987 (original budget prior to expropriation) high of 81.6 percent.

During the current fiscal year (prior to expropriation) the university general fund appropriations represent 79.2 percent of the state operating budgets. [SEE FIGURE 6]



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OTHER STATE BUDGET REVENUE

Between FY 1963 and FY 1988, other state budget revenue grew 1,039 percent, from $8,792,300 (ASU: $2,580,700; NAU: $533,600; UA: $5,678,000) to $100,101,500 (ASU: $45,782,000; NAU: $11,699,800; UA: $42,619,700). The annual compounded increase of this revenue averaged 41.6 percent, while the annual simple increase averaged 10.6 percent. [SEE FIGURE 1]

When adjusted for inflation (HEPI in 1967 dollars), other state revenue grew 142 percent during this 25 year period (from $10,517,200 to $25,438,800), for an average annual compounded increase of 5.7 percent. The annual simple increase averaged 3.9 percent. The HEPI averaged a 6.4 percent increase per year during this time.

REGISTRATION FEES AND TUITION

Both in state (resident) and out of state (nonresident) students pay registration fees when enrolling at Arizona's universities. Students pay a per credit hour fee when enrolling for one to 6 hours per semester. Students who enroll for 7 or more semester credit hours pay the full fee.

Nonresident students also pay tuition at graduated rates from seven to 11 credit hours, and the full rate for 12 or more credit hours per semester.

Between FY 1963 and FY 1988, the semester full time registration fee increased $494, or 475 percent, from $104 to $598 at the three universities.

The UA and ASU semester full time tuition charge increased $1,416, or 472 percent, from $300 to $1,716, while NAU tuition increased $1,280, or 776 percent, from $165 to $1,445, during this 25 year period.

SCHOLARSHIPS AND WAIVERS

Not all students pay registration fees and/or tuition. The ABOR authorizes the universities to award full and partial athletic, fine arts, undergraduate and graduate academic scholarships, and need based waivers to qualified students. The ABOR annually sets limits on the numbers of these awards.

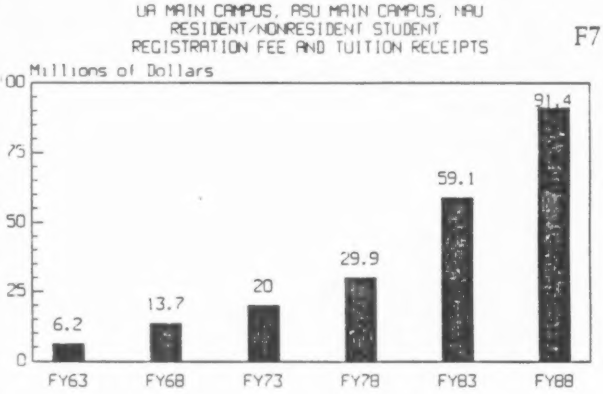
For faculty, staff, and their spouses who enroll for from one to 6 credit hours, ABOR also waives all but $25 of the registration fee (currently $63 per credit hour). For the dependent sons and daughters of faculty and staff, ABOR waives 75 percent of the registration fee. During the 1988 academic year, the universities estimate they will award over 15,000 full and partial waivers to students, and to faculty, staff, and their spouses and dependents each semester. The universities also project the worth of these waivers at $23.9 million, for the academic year, of which $21 million will benefit students attending the universities on academic, athletic, fine arts and need based scholarships and waivers.

STATE COLLECTIONS

Fees and Tuition Supporting State Operating Budgets

For FY 1988, the universities project a total of $124.3 million in registration fee and tuition receipts (ASU: $59.7 million; NAU: $16.6 million; UA: $48.0 million). Of the $124.3 million total, the universities will deposit with the State Treasurer $91.4 million, or 73.5 percent, as part of the State Collections supporting their State Operating Budgets.

During the current fiscal year, State Collections total 91.3 percent of Other State Budget Revenue. Between FY 1963 and FY 1988, these receipts have grown $85,211,600, or 1,373 percent, from $6,207,800 (70.6 percent of $8,792,300) to $91,419,400. [SEE FIGURE 7]



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If the legislature had appropriated capital outlay funds between FY 1980 and FY 1988, rather than having authorized the universities to issue revenue bonds to finance their construction needs, the universities' State Collections conceivably would now total $110.6

million, rather than $91.4 million in FY 1988. The $19.2 million difference represents current university debt service payments on bonds issued mostly since FY 1979.

LOCAL COLLECTIONS

Fees and Tuition Supporting Local Budgets

For FY 1988, the universities will retain for their local budgets the balance of these receipts, an estimated $32.9 million to fund: debt service of $19.2 million (ASU: $8.1 million; NAU: $3.3 million; UA: $7.8 million) on bonds issued to construct buildings; over $3 million to match state appropriations for building renewal; over $1 million for student financial aid set asides; and the balance for local operating budgets, such as alumni associations and associated students, and for physical plant maintenance.

STUDENT HEADCOUNT ENROLLMENTS

A student headcount enrollment reflects a body count of students enrolled during a semester on the twenty first calendar day following the first day of classes. The ABOR established the 21st day for counting students in 1976.

Between FY 1963 and FY 1988, the universities' student headcount enrollments grew 169 percent, from 32,396 to 87,119 . The annual compounded increase in these enrollments averaged 6.8 percent. The annual simple increase averaged 4.1 percent (a 6.3 percent average annual increase during the first 12 years, and a 2.1 percent average annual increase during the past 13 years). [SEE TABLE VII., AND FIGURE 8]

TABLE VII.

STUDENT HEADCOUNT ENROLLMENTS

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	13.765	41,169	27,404	199.1	8.0%	4.5%
NAU	2,869	13,445	10,576	368.6	14.7%	6.7%
UA	15,762	32,505	16,743	106.2	4.2%	3.0%
TOTAL	32,396	87,119	54,723	168.9	6.8%	4.1%

UA MAIN CAMPUS, ASU MAIN CAMPUS, NAU
TOTAL STUDENT HEADCOUNT ENROLLMENT,
UNDERGRADUATE ENROLLMENT AND
GRADUATE ENROLLMENT

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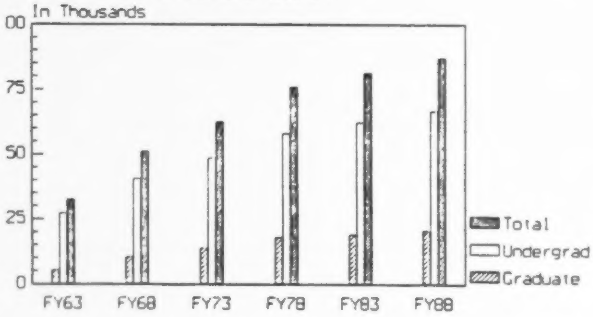


For both FY 1987 and FY 1988, however, the universities experienced fairly large headcount enrollment increases of 3.3, and 4.1 percent, respectively.

During this period, the three universities also experienced four years of double digit headcount enrollment growth over the prior year: FY 1964, 11.0 percent (UA-9.2%, NAU-16.6%, ASU-12.0%); FY 1965, 10.2 percent (UA-8.9%, NAU-19.7%, ASU-9.7%); FY 1966, 13.0 percent (UA-8.7%, NAU-31.4%, ASU-13.5%), and; FY 1976, 12.6 percent (UA-7.5%, NAU-10.4%, ASU-17.5%).

The universities also experienced three years of enrollment declines: FY 1977, -2.2 percent (UA, -.2%, NAU, +4.9%, ASU, -5.7%); FY 1983, -.3 percent (UA, -1.8%, NAU, -3.9%, ASU, +1.9%), and; FY 1985, -2.2 percent (UA, -.7%, NAU, +2.8%, ASU, -4.8%).

It should be noted that FY 1985 was the first year that ASU West enrollments were reported separately from ASU Main Campus enrollments. In Fall 1987, 2,792 students enrolled at ASU West. If we include this count with the ASU Main Campus enrollment of 41,169, we find that ASU enrollments actually increased 30,196, or 219.4 percent over FY 1963, and the enrollments for the three universities (including ASU West) increased 57,515, or 177.5 percent.

UNDERGRADUATE HEADCOUNT ENROLLMENTS

Between FY 1963 and FY 1988, the universities' undergraduate student headcount enrollments grew 146 percent, from 27,132 to 66,693. The annual compounded increase in undergraduate enrollments averaged 4.6 percent, while the annual simple increase averaged 3.9 percent. [SEE TABLE VIII., AND FIGURE 8]

TABLE VIII.

UNDERGRADUATE STUDENT HEADCOUNT ENROLLMENTS

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	10,761	31,133	20,372	189.3	7.6%	4.4%
NAU	2,714	10,406	7,692	283.4	11.3%	5.9%
UA	13,657	25,154	11,497	84.2	3.4%	2.5%
TOTAL	27,132	66,693	39,561	145.8	5.8%	3.9%

Although undergraduate enrollments have grown 146 percent during this 25 year period, they also have experienced a significant decline as a percentage of total enrollments. During Fall 1962, 83.8 percent of the students enrolled at the universities were undergraduates (UA: 86.6%; NAU: 94.6%; ASU: 78.2%). By Fall 1988, however, undergraduates represented only 76.7 percent of the total students enrolled (UA: 77.4%; NAU: 77.4%; ASU: 75.6%).

Between FY 1968 and FY 1988, the mix between undergraduates and graduates at both UA and ASU have remained fairly stable, with generally only minor year to year percentage changes (FY 1968 undergraduates: UA-78.3%; ASU-76.0%; FY 1988 undergraduates: UA-77.3%; ASU-75.6%).

NAU, however, has experienced a marked decline in undergraduates as a percentage of total headcount enrollments. As late as FY 1977, undergraduates represented 91.5 percent of NAU's total headcount enrollment, as compared with 77.4 percent in FY 1988.

It appears that a recent expansion by NAU of off campus course offerings in Maricopa County, Yuma, and other areas of the state may be the reason for this decline. During Fall 1987, 14.6 percent of NAU's total student headcount was enrolled in off campus courses. Only 400, or 20.4 percent of NAU's total off campus students enrolled in undergraduate courses.

Undergraduate students, however, represent nearly 90 percent of the total NAU on campus enrollment during the current fiscal year.

GRADUATE HEADCOUNT ENROLLMENTS

Between FY 1963 and FY 1988, graduate student headcount enrollments grew 15,162 or 288 percent, from 5,264 (UA: 2,105; NAU: 155; ASU: 3,004) to 20,426 (UA: 7,351; NAU: 3,039; ASU: 10,036). The annual compounded increase in graduate enrollments averaged 11.5 percent during this period, while the annual simple increase averaged 5.9 percent.

Graduate enrollments grew 249 percent and 234 percent, respectively, at UA and ASU during this 25 year period, and 1,861 percent at NAU. Again, NAU's graduate enrollment growth appears to be the result of expanded off campus course offerings, virtually all of which is concentrated in education (1,520, or 97.4 percent, of NAU's 1,560 off campus graduate students are enrolled in education courses, as compared with 54.6 percent of the on campus graduate students).

FULL TIME EQUIVALENT (FTE) STUDENT ENROLLMENTS

A FTE student count converts all student enrollments to a full time basis, as compared with headcount enrollments which include both full and part time students. It also provides a generally accepted measure of academic and other workloads. The universities also count FTE students on the twenty first day following the first day of classes.

Beginning with Fall 1987, the universities now calculate their FTE student enrollments in the following manner: (1) total lower division (freshman, sophomore) semester credit hours (SCH) attempted by all students, by level of course (rather than by the level of the student taking the course) divided by 15 (considered to be a full time load for a lower division student) = Total Lower Division FTE Students; (2) total upper division (junior, senior) SCH attempted by all students, divided by 12 = Total Upper Division FTE Students; (3) the sums of (1) and (2) = Total Undergraduate FTE Students; (4) total graduate division SCH attempted by all students, divided by 10 = Total Graduate FTE Students; (5) the sums of (3) and (4) = Total FTE Students. For the purposes of this report, we refer to this calculation as the "NEW METHOD" of counting FTE students.

Because of the additional weight given upper division students over lower division students, the "New Method" produces an average of 8.7 percent more FTE students for FY 1988 than does the "Old Method" (UA: 7.6%; NAU: 8.5%; ASU: 9.6%).

From Fall 1976 to Fall 1986, the universities counted FTE students in the following manner: (1) total lower and upper division SCH attempted, by all students by course level, divided by 15 = Total Undergraduate FTE Students; (2) total graduate division SCH attempted, by all students by course level, divided by 10 = Total Graduate FTE Students; (3) the sums of (1) and (2) = Total FTE Students. For the purposes of this report, we refer to this calculation as the "OLD METHOD" of counting FTE students.

From some unknown time in the past until Fall 1975, the universities counted FTE students in the following manner: exactly the same as the "OLD METHOD" above, except that the SCH attempted were counted by the level of the student taking the course, rather than by the level of the course itself. For the purposes of this report, we also refer to this calculation as the "OLD METHOD" of counting FTE students.

FTE STUDENT ENROLLMENTS

New Method

One cannot accurately calculate FTE students prior to FY 1977. At that time the universities revised their methodology of counting SCH attempted from student level to course level. This change grossly distorts lower and upper division SCH and FTE student data when using the new method to calculate FTE students. Also, while total undergraduate SCH data are reliable, the accuracy of the mixes between lower division and upper division SCH data is somewhat questionable prior to FY 1977.

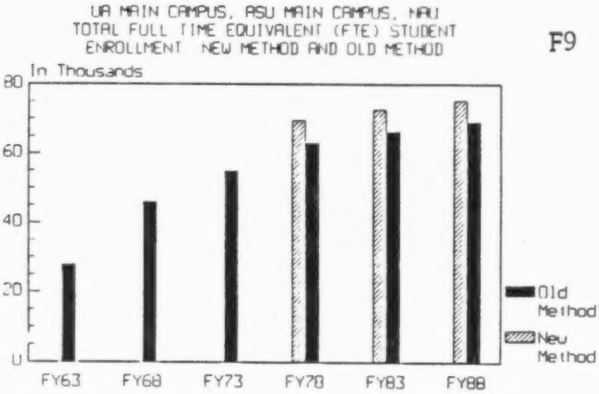
Between FY 1977 and FY 1988, FTE student enrollments (new method) grew from 67,276 to 75,210, or 11.8 percent. [SEE TABLE IX., AND FIGURE 9.]

TABLE IX.

FY 1977 AND FY 1988 FTE STUDENT ENROLLMENTS (NEW METHOD)

	FY 1977	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	30,487	34,206	3,719	12.2	1.1%	1.1%
NAU	10,223	11,961	1,738	17.0	1.5%	1.5%
UA	26,566	29,043	2,477	9.3	.8%	.8%
TOTAL	67,276	75,210	7,934	11.8	1.1%	1.0%

F9



When including the FY 1988 ASU West FTE student enrollment of 1,064 (new method) with the Main Campus enrollment, the total enrollment grew to 76,274 (ASU: 35,270), an increase of 8,998 (ASU: 4,783), or 13.4 percent (ASU: 15.7%).

With the ASU West FTE student enrollment included with the ASU Main Campus enrollment, the total university average annual compounded increase rises from 1.1 to 1.2 percent (ASU: from 1.1 to 1.4%), and the total university average annual simple increase rises from 1.0 to 1.1 percent (ASU: from 1.1 to 1.3%)

FTE STUDENT ENROLLMENTS

Old Method

The old method data reported below in Table X. provide an accurate comparison with the new method data reported above in Table IX..

TABLE X.

FY 1977 AND FY 1988 FTE STUDENT ENROLLMENTS (OLD METHOD)

	FY 1977	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	27,684	31,203	3,519	12.7%	1.2%	1.1%
NAU	9,443	11,025	1,582	16.8%	1.5%	1.5%
UA	24,608	26,984	2,376	9.7%	.9%	.9%
TOTAL	61,735	69,212	7,477	12.1%	1.1%	1.1%

Between FY 1977 and FY 1988, FTE student enrollments (old method) grew from 61,735 to 69,212, or 12.1 percent. [SEE TABLE X., AND FIGURE 9]

When including the FY 1988 ASU West FTE student enrollment of 922 (old method) with the ASU Main Campus enrollment, the total enrollment grew to 70,134 (ASU: 32,125), an increase of 8,399 (ASU: 4,441), or 13.6 percent (ASU: 16.0%).

With the ASU West FTE student enrollment included, the total university average annual compounded increase rises from 1.1 to 1.2 percent (ASU: from 1.2 to 1.5%), and the total university average annual simple increase also rises from 1.1 to 1.2 percent (ASU: from 1.1 to 1.4%).

Between FY 1963 and FY 1988, FTE student enrollments (old method) grew from 27,794 to 69,212, or 149.0 percent. [SEE TABLE XI., AND FIGURE 9]

TABLE XI.

FY 1963 AND FY 1988 FTE STUDENT ENROLLMENTS (OLD METHOD)

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	11,181	31,203	20,022	179.1	7.2%	4.2%
NAU	2,717	11,025	8,308	305.8	12.2%	6.0%
UA	13,896	26,984	13,088	94.2	3.8%	2.8%
TOTAL	27,794	69,212	41,418	149.0	6.0%	3.8%

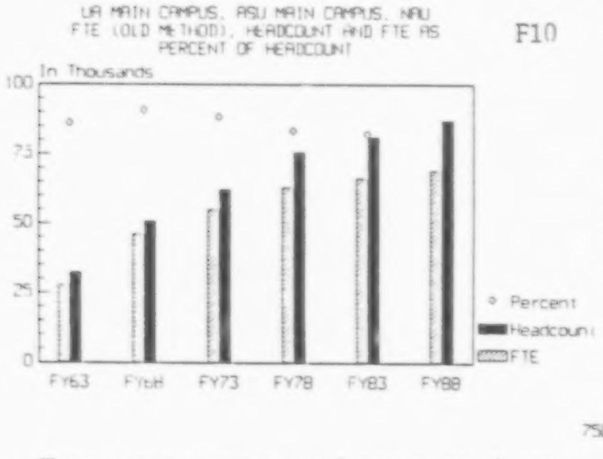
656

When including the FY 1988 ASU West FTE student enrollment of 922 with the ASU Main Campus enrollment, the total enrollments grew to 70,134 (ASU: 32,125), an increase of 42,340 (ASU: 20,944), or 152.3 percent (ASU: 187.3%).

With the ASU West FTE student enrollment included in the total, the universities' annual average compounded increase rises from 6.0 to 6.1 percent (ASU: from 7.2 to 7.5%), and the total university annual average simple increase rises from 3.9 to 4.0 percent (ASU: from 4.3 to 4.4%).

Over this period of 25 years, FTE student enrollments have declined as a percentage of headcount enrollments. In FY 1963, the universities' FTE student enrollments represented nearly 86 percent of their headcount student enrollments. By FY 1988, FTE student enrollments represented only about 79 percent of the headcount enrollments. [SEE FIGURE 10].

F10



Every year, more and more students have enrolled part time rather than full time at the three universities. It appears that this trend will continue in future years.

FTE enrollments jumped from about 86 percent in FY 1963 to a peak of around 90 percent of headcount between FY 1966 and FY 1972 (the Vietnam War era). Since FY 1973, FTE enrollments as a percentage of headcount enrollments have steadily dropped until reaching an all time low in FY 1988. [SEE TABLE XII. AND FIGURE 101

TABLE XII.

FTE STUDENTS AS A PERCENTAGE OF HEADCOUNT STUDENTS

	FY 1963	FY 1988
ASU	81.2	75.8
NAU	94.7	82.0
UA	88.2	81.0
TOTAL	85.8	79.4

STATE OPERATING BUDGETS PER FTE STUDENT

Old Method

Between FY 1963 and FY 1988, the State Operating Budgets per FTE student grew 563 percent, from $1,051 to $6,970. The annual compounded increase in the budgets per FTE student averaged 22.5 percent, while the annual simple increase averaged 8.0 percent. [SEE TABLE XIII. AND FIGURE 11]

TABLE XIII.

STATE OPERATING BUDGETS PER FTE STUDENT

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	$ 938	$6,382	$5,474	602.9	24.1%	8.2%
NAU	880	6,068	5,188	589.5	23.6%	8.2%
UA	1,200	8,018	6,818	568.2	22.7%	8.0%
TOTAL	$1,051	$6,970	$5,919	563.2	22.5%	8.0%
UA ADJ (1)	$ 937	$6,993	$6,056	646.3	25.9%	8.5%
TOTAL ADJ	$ 920	$6,570	$5,650	614.1	24.6%	8.3%

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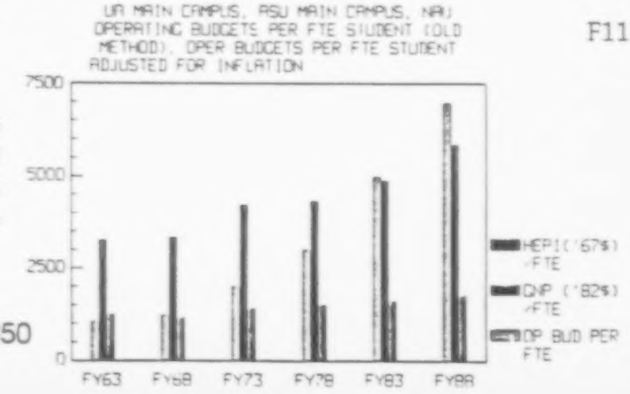
(1) Excludes the state land grant university agriculture programs.

F11



When adjusted for inflation (HEPI, 1967 dollars), the operating budgets per FTE student grew 41 percent during this 25 year period (from $1,257 to $1,771), for an average annual compounded increase of 1.6 percent. The annual simple increase averaged 1.5 percent. The HEPI increased an average of 6.4 percent per year during this time. [SEE TABLE XIV. AND FIGURE 11]

TABLE XIV.

STATE OPERATING BUDGETS PER FTE STUDENT, ADJUSTED FOR INFLATION

(HEPI IN 1967 DOLLARS)

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	$1,086	$1,622	$ 536	49.4	2.0%	1.7%
NAU	1,053	1,542	489	46.4	1.9%	1.7%
UA	1,435	2,038	603	42.0	1.7%	1.9%
TOTAL	$1,257	$1,771	$ 514	40.1	1.6%	1.5%
UA ADJ (1)	$1,121	$1,777	$ 656	58.5	2.3%	1.9%
TOTAL ADJ	$1,100	$1,678	$ 570	51.8	2.1%	1.8%

----

(1) Excludes the state land grant university agriculture programs.

In short, with FTE student enrollment growth considered, the universities' state operating budgets exceeded the rate of inflation by an average of 1.5 percent per year between FY 1963 and FY 1988.

When considering $59 million in "one time" budget reductions (temporary, one year cuts that did not carry into the following year) the universities have suffered during Fiscal Years 1982, 1983, 1987, and 1988, however, their state operating budgets exceeded the average annual rate of inflation by only 1.0 percent.

STATE GENERAL FUND APPROPRIATIONS PER FTE STUDENT

Between FY 1963 and FY 1988, the universities' appropriations per FTE student grew 652 percent, from $735 to $5,524. The annual compounded increase in appropriations per FTE student averaged 26.1 percent, while the annual simple increase averaged 8.6 percent. [SEE TABLE XV. AND FIGURE 12]

TABLE XV.

GENERAL FUND APPROPRIATIONS PER FTE STUDENT

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	$ 677	$4,915	$4,238	626.0	25.0%	8.5%
NAU	684	5,007	4,323	632.0	25.3%	8.6%
UA	791	6,438	5,647	713.9	28.6%	8.9%
TOTAL	$ 735	$5,524	$4,789	651.6	26.1%	8.6%
UA ADJ (1)	$ 596	$5,533	$4,937	828.4	33.1%	9.9%
TOTAL ADJ	$ 637	5,171	$4,534	711.8	. 28.5%	9.4%

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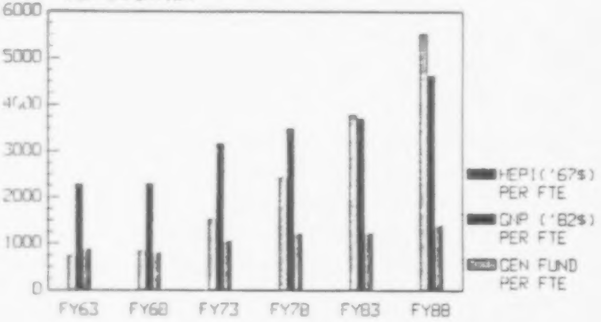
(1) Excludes the state land grant university agriculture programs.

UA MAIN CAMPUS, ASU MAIN CAMPUS, NAU
GENERAL FUND PER FTE STUDENT(OLD METHOD)
GENERAL FUND PER FTE STUDENT ADJUSTED
FOR INFLATION

F12



When adjusted for inflation (HEPI, 1967 dollars), the general fund appropriations per FTE student grew 60 percent during this 25 year period, (from $879 to $1,404), for an average annual compounded increase of 2.4 percent. The annual simple increase averaged 2.0 percent, while inflationary increases averaged 6.4 percent per year. [SEE TABLE XVI. AND FIGURE 12]

TABLE XVI.

GENERAL FUND APPROPRIATIONS PER FTE STUDENT, ADJUSTED FOR INFLATION

(HEPI, IN 1967 DOLLARS)

	FY 1963	FY 1988	Increase	% Inc	Comp Avg Yrly Inc	Simple Avg Yrly Inc
ASU	$ 810	$1,249	$ 439	54.2	2.2%	2.0%
NAU	818	1,272	454	55.5	2.2%	2.0%
UA	$ 947	$1,636	$ 689	72.8	2.9%	2.4%
TOTAL	$ 879	$1,404	$ 525	59.7	2.4%	2.0%
UA ADJ (1)	$ 713	$1,406	$ 693	97.2	3.9%	2.8%
TOTAL ADJ	$ 762	$1,314	$ 552	72.4	2.9%	2.1%

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(1) Excludes the state land grant university agriculture programs.

In short, the universities' general fund appropriations per FTE student kept ahead of inflation at an average rate of 2.0 percent per year between FY 1963 and FY 1988.

When considering the $59 million in "one time" budget reductions the universities have lost over four of the past 7 years, however, their general fund appropriations have exceeded average annual inflationary increases by only 1.5 percent.

UNIVERSITY DEGREES CONFERRED

From FY 1963 to FY 1987, the Arizona universities awarded 282,477 degrees to graduating students. [SEE TABLE XVII.]

Data published by the U.S. Department of Education, Center for Education Statistics, State Higher Education Profiles: 1985, indicates that while Arizona ranked 25th and 26th, respectively, among the states in undergraduate and graduate/-professional degrees produced by four year and above public institutions in 1985, it ranked first in both categories for degrees produced per institution.

TABLE XVII.

DEGREES CONFERRED FY 1963 TO FY 1987

DEGREES CONFERRED	ASU	NAU	UA	TOTAL
Associate	-0-	469 (1)	-0-	469
Bachelor's	94,705	29,616	75,752	200,073
Master's/Specialist	28,711	5,545	29,717	67,973
Doctorate/Professional	5,458	401	8,103	13,962
Total Degrees Conferred	128,874	40,031	113,572	282,477

(1) NAU awarded Associate's degrees between FY 1973 and FY 1985

In FY 1963, the Arizona universities awarded 4,364 degrees, of which only 66 were doctorate or professional (law) degrees, to graduating students. [SEE TABLE XVIII. AND FIGURE 13] NAU conferred its first two doctorate degrees in FY 1973.

TABLE XVIII.

DEGREES CONFERRED IN FY 1963

DEGREES CONFERRED	ASU	NAU	UA	TOTAL
Bachelor's	1,482	307	1,528	3,317
Master's/Specialist	471	95	415	981
Doctorate/Professional	22	-0-	44	66
Total Degrees Conferred	1,975	402	1,587	4,364

UA MAIN CAMPUS, ASU MAIN CAMPUS, NAU
DEGREES CONFERRED BACHELOR, MASTER, DOCTORATE

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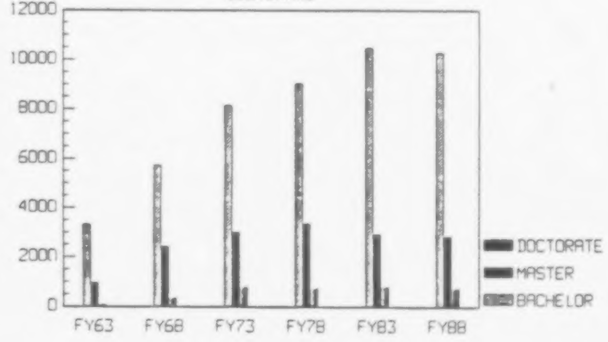


During this 25 year period, the universities produced their lowest total of 74,364 degrees in FY 1963. From FY 1963 until FY 1977, degree production grew at a rate of about 600-700 per year. It appears that degree production has pretty much stabilized at an average of around 13,800 since FY 1977 (with a low of 13,189 in FY 1978, and a high of 14,281 in FY 1983).

Undergraduate degrees, when compared with total degrees produced, have averaged 70.8 percent of the total over this period. Undergraduate degree production hit an apex of 76.0 percent of total production in FY 1963, a nadir of 67.1 percent in FY 1977, experienced a general decline from FY 1966 to FY 1973 (a 68.3 percent average), grew steadily from then to stabilize at 74.2 to 74.3 percent of the total from FY 1984 to FY 1987.

Graduate degree production, of course, countered those trends exhibited for undergraduate degree production over

25 years. For the past four years, graduate degrees as a percentage of total degrees produced, are at their lowest levels since FY 1963.

TABLE XIX.

DEGREES CONFERRED IN FY 1987

DEGREES CONFERRED	ASU	NAU	UA	TOTAL
Bachelor's	5,276	1,521	3,483	10,280
Master's/Specialist	1,115	486	1,248	2,849
Doctorate/Professional	261	62	418	741
Total Degrees Conferred	6,652	2,069	5,149	13,870

UNIVERSITY DEGREES CONFERRED AS A PERCENTAGE OF STUDENT HEADCOUNT ENROLLMENT

Total degrees conferred have averaged 17.2 percent of total student headcount enrollments over this 25 year period. These percentages grew from a low of 13.5 in FY 1963 to 14.9 in FY 1966, jumped to 16.1 in FY 1967 and grew rapidly until peaking at 19.3 in FY 1973.

Since then, total degrees conferred as a percentage of total student headcount enrollments have slowly, but steadily dropped to a modern day low of 16.6 percent in FY 1987. [SEE TABLE XX. AND FIGURE 14].

While the ASU and NAU percentages both peaked in FY 1973, along with the percentage for the three universities, UA, strangely, did not hit its peak (19.0 percent) until FY 1975. UA also has surpassed its FY 1967-1973 Vietnam era peak of 17.8 percent during 11 of the last 14 years.

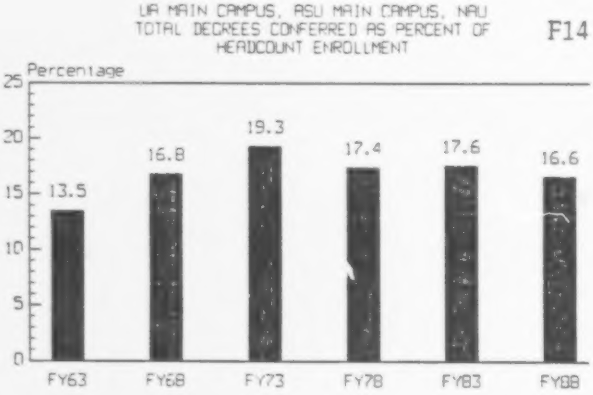
These percentages are another indicator of full time and part time university enrollments, i.e.; low percentages correlate with high part time enrollments, and high percentages with low part time enrollments.

These percentages are another indicator of full time and part time university enrollments, i.e.; low percentages correlate with high part time enrollments, and high percentages with low part time enrollments.

TABLE XX.

TOTAL DEGREES CONFERRED AS A PERCENTAGE OF TOTAL HEADCOUNT ENROLLMENTS

	ASU	NAU	UA	TOTAL
FY 1963	14.3	14.0	12.6	13.5
FY 1968	16.6	16.4	17.0	16.8
FY 1973	20.2	21.7	17.6	19.3
FY 1978	17.0	15.9	18.4	17.4
FY 1983	16.3	19.0	18.7	17.6
FY 1987	16.9	15.7	16.6	16.6



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BACCALAUREATE DEGREES CONFERRED AS A PERCENTAGE OF UNDERGRADUATE ENROLLMENTS

Annual baccalaureate degrees produced by the Arizona universities have averaged 16.0 percent of undergraduate headcount enrollments over this 25 year period (ASU: 17.7%; NAU: 14.5%; UA: 14.5%). Although ASU has, on the average, fewer full time students than NAU and UA, ASU has much heavier upper division student enrollments than NAU and UA. ASU, thus, has higher graduation rates than either NAU or UA (junior and senior level students have greater potential for graduation than do freshman and sophomore level students).

This percentage consistently has stayed between 15.6 and 16.8 percent from FY 1970 to the present.

TABLE XXI.

BACCALAUREATE DEGREES AS A PERCENTAGE OF UNDERGRADUATE HEADCOUNT ENROLLMENTS

	ASU	NAU	UA	TOTAL
FY 1963	13.8	11.3	11.2	12.2
FY 1968	15.3	11.7	14.1	14.2
FY 1973	19.2	16.9	14.4	16.8
FY 1978	16.4	13.6	15.5	15.6
FY 1983	16.1	17.3	16.9	16.7
FY 1987	17.7	14.4	14.5	16.0

GRADUATE DEGREES CONFERRED AS A PERCENTAGE OF GRADUATE HEADCOUNT ENROLLMENTS

Annual graduate degrees produced by the Arizona universities have averaged 22.8 percent of graduate headcount enrollments over 25 years (ASU: 18.6%; NAU: 51.3%; UA: 25.5%). Between FY 1963-1966, this share grew from 19.9 to 23.4 percent. Not surprisingly, the percentage jumped to 27.0 in FY 1967, where it varied from 25.0 to 28.9 until FY 1973. (The Vietnam War era, again.)

TABLE XXII.

GRADUATE DEGREES AS A PERCENTAGE OF GRADUATE HEADCOUNT ENROLLMENTS

	ASU	NAU	UA	TOTAL
FY 1963	16.4	61.3	21.8	19.9
FY 1968	21.0	79.6	26.1	25.8
FY 1973	23.1	70.6	27.4	27.4
FY 1978	18.8	31.1	27.4	23.0
FY 1983	14.8	25.4	25.4	19.8
FY 1987	14.5	20.4	23.3	18.6

After FY 1973, this share began to decline fairly steadily to an all time low of 18.6 percent in FY 1987.

What is surprising is the rate at which NAU produced graduate degrees from FY 1963-1978, when it averaged 71.9 with a high of 101.3 in FY 1969 (460 graduate students, and 466 degrees conferred). During the earlier years of this study, relatively few numbers of NAU students enrolled full time in, and graduated from one year master's degree programs, thus producing these high percentages. Currently, the NAU percentages more closely resemble those of UA and ASU.

CONCLUSIONS AND RECOMMENDATIONS

STATE BUDGET DEVELOPMENT PROCESS AND BUDGET FORMS

- Only the governor's budget office (EBO) has the authority to effect any significant changes in the current state budget development process or budget request forms.

STATE BUDGET REQUEST CYCLE AND UNIVERSITY BUDGET REQUESTS

- The eighteen month university budget request cycle, and the detailed continuation budget and decision package requests which contain many workload and performance measures (or "accountability" measures, as Coopers and Lybrand refers to them), provide ample opportunity at all levels for meticulous review, analysis, issue development, and rational, objective decision making.
- The universities develop their budget requests in accordance with the guidelines, missions, and long and short range goals approved by ABOR.

- The ABOR annually establishes an equal percentage of each university's most current state operating budget as a maximum amount for decision package requests. Although ABOR approves a priority ordering for each university's decision package requests, it does not establish priorities for the three university system.

The ABOR should establish a decision package request priority order for the three university system.

- During the past decade, the EBO and JLBC budget documents have not addressed pertinent university budget issues, and have not provided substantive descriptions of the university budget requests, or their own budget recommendations. In addition, the house and senate appropriations subcommittees each conduct only one or two budget hearings, from one to two hours in length, for each university.

If legislators want more information and accountability from the Arizona universities, they should require the JLBC staff to identify budget issues, and provide descriptions of university requests and staff recommendations in the annual JLBC staff budget document.

The appropriations subcommittees also should spend more than one to two hours per session on each university's budget request if the members desire to learn more about university budgets.

- The annual appropriations act establishes a funding level for each university, rather than for each budget program within the university. This aggregate funding policy, along with an almost unlimited statutory authority to effect temporary and permanent base budget changes through the reallocation of funds (with ABOR approval), has provided university administrators with the flexibility to respond to targets of opportunity, react to legislatuve budget expropriations, and otherwise effectively, efficiently and creatively manage the institutions.

INFLATION AND UNIVERSITY BUDGETS

Inflation, as measured by the Higher Education Price Index (HEPI), rose 371 percent (an actual year to year average increase of 6.4 percent) in the 25 years between FY 1963 and FY 1988. The HEPI (in 1966-1967 dollars) increased from 83.6 in FY 1963 to a projected 393.5 for FY 1988. (The FY 1987 to FY 1988 increase is estimated at 4.2 percent, or the same as the prior year's increase.

- When adjusted for inflation, the university state operating budgets grew 251 percent, an average annual simple increase of 5.2 percent, while General Fund appropriations grew 298 percent, an average annual simple increase of 5.8 percent.
- When adjusted for both inflation and enrollment growth, however, the state operating budgets (per FTE Student) grew 41 percent, an average annual simple increase of 1.5 percent, while the General Fund appropriations per FTE student grew 60 percent, an

average annual simple increase of 2.0 percent.

- This kind of state funding history has not produced a lot of "fat" in university budgets. When considering the universities' loss of $59 million resulting from budget reductions over four of the past seven years, their annual state operating budgets and general fund appropriations have outpaced average annual inflationary increases by only 1.0 percent, and 1.5 percent, respectively.

- If state funding continues at the same rate of growth in the future, the Arizona universities will not have the required resources if the state decides they should compete with the best public universities in the nation.

STATE OPERATING BUDGETS BY STATE PROGRAM

- Over a fourteen year period since FY 1974, each program's share of the total state operating budget has changed insignificantly. Although Instruction budgets have dropped 3.8 points, from 53.8 percent to 50.0 percent of the total, the Academic Support and Student Services budgets have increased from 10.0 to 12.7 percent, and from 4.2 to 5.7 percent, respectively, for a total combined increase of 4.2 points.

- Significant budget increases in computing and library services, which directly support the students served in the Instruction Program, have produced the growth in Academic Support programs. Additional funding for new and expanded programs for students in counseling, tutoring, health, and the recruitment and retention of minority students have produced the growth in the Student Services programs.

- Today's student clearly receives more, and better academic and student support services than he or she did twenty five, 14, or even 5 years ago.

REGISTRATION FEES AND TUITION

- The Arizona universities still provide a relatively low cost education to both resident and nonresident students as compared with many public universities in other states. The ABOR recently decided to increase resident and nonresident student charges, respectively, from 20 to 25 percent, and from 80 to 85 percent of the "cost of education" (a formula that includes the Instruction and Student Services program budgets, and a portion of Academic Support and Institutional Support program budgets) over a period of several years.

- It is moot whether or not the "cost of education" formula and the resulting registration fee and tuition structures are reasonable. The legislature generally uses the revenues produced annually from tuition and fee increases to offset (reduce) the general fund appropriations to the universities. The incentives to increase tuition and fees to higher levels lie not with ABOR and the universities, but instead with the legislature, which can use the additional revenue produced by tuition and fee increases to construct prisons,

663

increase health care funding for the needy, or for any other state programs or purposes.

THE ARIZONA LEGISLATURE SHOULD:

hold the universities harmless for all future tuition and fee increases by allowing them to retain the additional revenue in their local budgets for debt service, and some new and expanded programs, or;

permit the universities to retain all their registration fee and tuition revenue for the same purposes, while making offsetting reductions in the state operating budgets, most likely from the Student Services and/or Institutional Support programs.

Either of the above actions would:

place the incentive for increasing tuition and fees where it belongs, with ABOR and the universities, while reducing the pressure on the legislature for university general fund appropriations.

provide the universities with more flexibility to manage budget reductions during years of state general fund revenue shortfalls.

SCHOLARSHIPS AND WAIVERS

o The ABOR has implemented in Arizona one of the most liberal scholarship and waiver policies for public universities in the United States. It appears, on the other hand, that direct state appropriations for student financial aid are lower in Arizona than in most other states.

BEFORE FURTHER MODIFYING ANY OF ITS CURRENT FINANCIAL AID POLICIES,

ABOR SHOULD:

o undertake a study to determine how well Arizona compares with other states in all aspects of student financial aid.

o The study should include a review of all current ABOR scholarship and waiver policies, university financial aid and loan programs, and state appropriations for financial aid.

UNIVERSITY ENROLLMENTS

o Undergraduate enrollments have declined as a percentage of total headcount enrollments, although the mix between undergraduates and graduates has remained fairly stable at both UA and ASU since FY 1968 (around 77/23). Undergraduate enrollment at NAU, however, has dropped precipitously, from 91.5 percent in FY 1978 to 77 percent in FY 1988.

It appears that NAU's recent expansion of mostly graduate level course offerings into Maricopa County, Yuma, and other areas of the state may be the reason for this decline.

o FTE student enrollments also have declined as a percentage of total headcount enrollments. This percentage peaked at around 90 during the Vietnam War era (FY 1966 to FY 1972) and has dropped steadily since then to an all time low of 79.4 in FY 1988. This means that more students now enroll on a part time basis than during the Vietnam era. This decline has been so steady, and significantly large, that it now appears to be a trend for the future.

UNIVERSITY DEGREES CONFERRED

- Degree production appears to have stabilized since FY 1977 at about 13,800 per year. Undergraduate degrees, as a percentage of total degrees conferred, also appear to have stabilized since FY 1984 at about 74 percent of the total, after experiencing steady increases from around 68 percent during the Vietnam War era.

- Total degrees conferred have averaged just over 17 percent of student headcount enrollments over this 25 year period. This percentage grew from a 25 year low of 13.5 in FY 1963, peaked at 19.3 during the Vietnam era, and has steadily dropped since then to a modern day low of 16.6 in FY 1987. Strangely, the UA percentage did not peak until FY 1975 (19.0), and has surpassed the Vietnam era peak of 17.8 for 12 of the past 14 years.

- ASU has higher annual baccalaureate degree graduation rates than NAU and UA (the 25 year averages for degrees as a percentage of undergraduate headcount enrollments are 16.7, 14.4 and 14.8, respectively), but not necessarily because ASU students are more persistent, or because ASU is more effective at moving students through the system. Although ASU has more part time students than either NAU and UA, ASU also has heavier upper division (junior and senior level) enrollments than either NAU or UA, and upper division students have greater graduation potential than do lower division students.

- NAU has produced more graduate degrees as a percentage of graduate headcount enrollments than have ASU and UA (the 25 year percentages average 51.3, 18.6, and 25.5, respectively). The NAU percentage, however, has dropped dramatically in recent years (20.4 in FY 1987, as compared with 14.5 at ASU, and 23.3 at UA. This percentage for the three universities jumped and peaked at 28.9 during the Vietnam era, and since has declined steadily to an all time low of 18.6 in FY 1987.

- The degree data, as with the enrollment data, indicate that:

- students probably are more likely to enroll full time during times of war than during times of peace, or at least during those times the Selective Service System operates a draft;

- trends predict rising numbers of part time students, and falling numbers of full time students in future years.

The universities' strategic plans should consider the growing trend for part time, rather than full time, student enrollments.

DATA SOURCES

FY 1963-1966:	UA, NAU, ASU Operating Budget Requests presented by ABOR to the Arizona Legislature

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FY 1963-1989: UA, NAU, ASU Legislative Budget Requests

FY 1962-1987: UA, NAU, ASU Fall Semester ABOR Enrollment Reports

THE ROLE OF PRIVATE FUND RAISING IN ENHANCING THE EXCELLENCE AND COMPETITIVENESS OF ARIZONA'S UNIVERSITIES

EDWARD JOHNSON

The most significant trend in American higher education fund raising during the past two decades has been the striking success of its public institutions in attracting private donations. Twenty years ago, public institutions received twenty percent of all gifts given to four-year institutions. They now receive thirty-three percent of all gifts. According to the U.S. Department of Education, private gifts now account for 3.2 percent of all public institution revenues.

The rationale for increased fund raising efforts by public institutions has been the clear recognition that private support makes the difference between a good university and an excellent one. The rising costs of operating and maintaining an excellent public university system with its multiple missions can no longer be met by state appropriations and tuition revenues alone. Arizona has proven to be no exception. The evidence presented in the Task Force final report shows that Arizona's universities are becoming more and more competitive on a national scale. Their success is due, in part, to the impact of private funds, particularly in the science and engineering fields.

The purpose of this working paper is to examine the role of private fund raising in enhancing the excellence and competitiveness of our three universities. The examination will focus on national trends in university philanthropy with a particular focus on state matching gift programs, historical fund raising comparisons of the three universities and their peers, and recommendations for enhancing future fund raising efforts.

ARIZONA TRENDS

All three Arizona universities have established foundations as their primary agencies through which gifts are given to the universities. The UA Foundation was established in 1958. As of June 30, 1987, its assets totaled approximately $55,571,035. The ASU Foundation was created in 1955 and has assets of approximately $17.5 million. The NAU Foundation began in 1959, and currently manages assets of approximately $4,139,361. Each foundation is a private, non-profit corporation with boards composed of prominent Arizona leaders. Each institution actively solicits alumni, nonalumni individuals, foundations, corporations and parents of

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students for funds through Annual Fund programs. Funds from those efforts are utilized by the universities for program enrichment beyond the state appropriations process such as scholarships, fellowships and research grants. Each university also conducts capital campaigns, generally for endowments and capital projects.

Each university also has a relationship with a university athletics foundation and numerous support groups including fine arts and liberal arts organizations.

In 1986-87 the three Arizona universities raised $60,566,654 in private funds from all of these efforts, which was approximately six percent of their total operating budgets. The University of Arizona (UA) raised $37,685,588; Arizona State University (ASU) raised $18,546,430; and Northern Arizona University (NAU) raised $4,334,636 (Figure 1.)

FIGURE 1

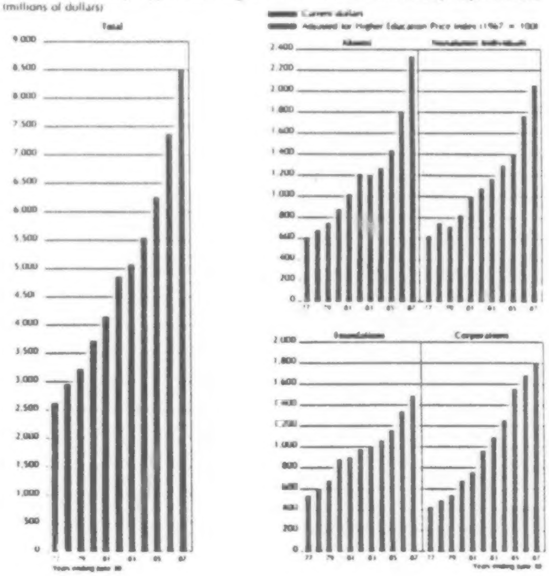
	Alumni	Nonalumni	Foundations	Corporations
UA	$427,160	$16,831,666	$4,935,554	$12,810,238
ASU	231,230	7,804,462	2,127,240	6,789,435
NAU	312,669	1,624,664	625,435	1,334,511

NATIONAL TRENDS

According to statistics compiled by the Council for Aid to Education (CFAE), private gifts to colleges and universities climbed $1.1 billion in the 1986-87 academic year to an all-time estimated high of $8.5 billion. The past decade has witnessed an average annual growth rate of 12 percent with steady increases in giving by alumni, nonalumni, foundations and corporations (Figure 2). CFAE has cited four trends which help explain the continuing success of educational fund raising efforts. The number of potential donors continues to increase as the millions of alumni who attended in the late 1960s and 1970s become more capable of giving. All institutions have become more aggressive and more sophisticated in their fund raising. A booming stock market and generally favorable economic conditions have helped sustain individual giving. Finally, federal tax policy, at least through 1987, has encouraged additional giving.

FIGURE 2

Estimated Voluntary Support of Colleges and Universities. Total and by Major Sources (millions of dollars)



Virtually all gains in voluntary support, at least during the past five years, have significantly exceeded the rate of inflation, whether measured by the Consumer Price Index (CPI) or the Higher Education Price Index (HEPI). During that time period, giving rose by 75 percent while inflation rose by 19 percent (CPI index) and 30 percent (HEPI). The result has been a rise of approximately 35 percent in the real purchasing power of private gifts.

FIGURE 3

Stanford University	$198.534.823
Harvard University	177.976.000
Cornell University	149.702.435
Yale University	120.063.734
UNIVERSITY OF MINNESOTA	116.328.173
Washington U. (St.Louis)	110.427.402
Columbia University	104.845.815
Massachusetts Inst. of Tech.	101.421.830
Johns Hopkins University	92.646.994
Southern California, U. of	91.203.534
Princeton University	90.808.608
WISCONSIN, U. OF—MADISON	88.148.456
Pennsylvania, U. of	87.241.444
ILLINOIS, U. OF	84.075.515
CALIFORNIA INST. OF TECH.	80.349.037
WASHINGTON, U. OF	77.687.223
Chicago, U. of	74,965.280
Duke University	73.563.708
Wake Forest University	66.255.406
OHIO STATE UNIVERSITY	64.759.998

FIGURE 4

SOURCES OF SUPPORT

Category	National	ASU	UA
Current Operations(Unrestricted)	5.8%	2.7%	.6%
Current Operations(Restricted)	57.1	58.2	78.1
Capital	13.6	25.3	15.3
Endowment(Unrestricted)	1.2	.1	.0
Endowment(Restricted)	21.8	13.5	5.9
Loan Funds	.6	.0	.0

FIGURE 5

Category	National	NAU
Current Operations(Unrestricted)	12.3%	3.6%
Current Operations(Restricted)	47.9	48.3
Capital	18.1	16.2
Endowment(Unrestricted)	2.6	26.0
Endowment(Restricted)	.3	.0

Fund raising comparisons among institutions must be made very carefully. The impact of a capital campaign or a single major gift to an institution can distort figures and result in inappropriate comparisons. Certain yearly and longitudinal comparisons can be helpful in ascertaining the competitiveness of our state institutions in attracting private gifts. In 1986-87 six of the top twenty national university leaders in fund raising were public institutions (Figure 3).

A comparison of UA and ASU with all public doctoral institutions responding to the 1986-87 CFAE Voluntary Support of Education Survey shows that UA received a much higher percentage of its funds for restricted current operations and a much lower percentage of restricted endowment funds than the national average. ASU received a much higher percentage of its funds for capital purposes (reflecting its capital campaign) and a much lower percentage for restricted endowment funds (Figure 4).

NAU received a much lower percentage of unrestricted current operations gifts than its public comprehensive institution counterparts. It received a much higher percentage of unrestricted endowment funds (Figure 5).

ASU and UA receive significantly more funds from nonalumni and significantly less funds from alumni than the national average. This largely attributable to the relatively young age of the majority of their alumni (Figure 6).

663

FIGURE 6

Sources of Support

Category	National	ASU	UA
Corporations	30.3%	36.6%	34.0%
Alumni	23.5	1.2	1.1
Other Individuals	18.9	40.9	45.0
Foundations	15.5	11.5	13.1
Other	11.4	9.7	6.6
Parents	.3	.1	.0
Religious Organizations	.1	.0	.0

FIGURE 7

Category	National	NAU
Corporations	32.7%	41.2%
Other Individuals	27.1	14.5
Alumni	18.6	9.7
Foundations	12.0	19.3
Other	7.9	13.4
Parents	1.7	1.9

NAU received a greater percentage of gift support from corporations and foundations than did their national counterparts. They also received a smaller percentage of gifts from alumni and nonalumni (Figure 7).

The 1986-87 national average alumni participation rates for gifts to public doctoral institutions was 18.5%. ASU and UA were well below that average at 6.8% and 5.4% respectively. NAU had an alumni partici-pation rate of 11.3 as compared to the 13.6% national average for comparable institutions.

Average gift totals were likewise significantly below the national average of $279. The average alumni gift to ASU was $25. The average alumni gift to UA was $63.02. The average alumni gift to NAU was $64.46 as compared to the national average for public comprehensive institutions of $100. The average amount of gifts received from corporate matching gift programs to public doctoral institutions was $351,212. ASU received $101,408 and UA received $153,026. The average amount of gifts received from corporate matching gift programs to public comprehensive institutions was $34,419. NAU received $33,841.

As noted earlier, institutional comparisons in fund raising success should also reflect multiple year efforts in order to minimize the impact of a single gift or a capital campaign. The three Arizona universities were compared with a group of their self-selected peer institutions (Figures 8 & 9).

FIGURE 8

UNIVERSITY OF ARIZONA PEERS

Institution	Avg. Yearly Fund Raising 1983-87	% inc.	Funds Per FTE Fund Raiser	Endowment-Market Value-1987
Minnesota	$77,248,021	88	$2,769,718	$308,428,052
Illinois	67,976,636	72	8,407,551	141,270,100
Washington	53,020,205	155	3,377,705	232,420,000
UC-Berkeley	43,485,887	153	2,782,446	N/A
Michigan	55,343,791	21	N/A	332,264,192
Ohio State	37,726,896	221	1,012,031	253,176,609
Florida	37,122,785	78	1,469,600	125,382,484
Penn State	31,949,863	175	4,883,816	134,081,808
North Carolina	28,659,314*	101	2,397,184	124,200,279
ARIZONA	27,246,470	40	2,355,349	58,767,856
Colorado	24,055,796	73	2,735,109	43,027,690
Maryland	18,642,335*	N/A	1,228,200	61,936,568
Purdue	17,899,172	2	1,468,824	120,717,240
AVERAGE	40,029,013	96	2,907,294	161,389,406

*three year avg.

The comparison shows that UA and ASU are approximately in the lower one-third of their peer groups. It is not unexpected that the endowments for the two institutions would also be quite small compared to institutions that have been raising funds for a much longer period of time. It must also be noted that UA has fifty-three percent les fund raising staff than its peer average. ASU has approximately twenty-five percent fewer staff than its peer average.

An examination of their 1987 athletic conference institutional statistics finds ASU & UA in the lower half, although the UA is fourth in funds raised per full-time equivalent fund raisers (Figure 10).

The Arizona universities were late starters in major development efforts as compared to other large universities. In most cases those institutions were able to capitalize on strong regional philanthropic traditions fostered through the historical successes of local private colleges and universities. Because there are few private colleges in the state, a tradition of giving to local educational institutions is still being developed. The institutions must also compete against the alma maters of our large number of in-migrants. It is estimated that at any one time, 125-150 colleges and universities are conducting or about to begin capital fund drives for at least $15 billion. The recent fund raising success enjoyed by the Arizona universities in their capital campaigns is impressive and bodes well for both the future development efforts and the competitive status of the institutions. However, the universities cannot rest on these laurels. A ten year examination of peer institutions shows that recent Arizona efforts have allowed our

FIGURE 9

ARIZONA STATE UNIVERSITY PEERS

Institution	Avg. Yearly Fund Raising 1983-87	% inc.	Funds Per FTE Fund Raiser	Endowment-Market Value-1987
Florida	$37,122,785	78	$1,469,600	$126,382,484
Indiana	36,558,378*	37	1,453,074	196,257,000
Penn State	31,949,863	175	4,883,816	134,081,808
Michigan State	28,756,383	57	N/A	39,876,688
Arizona	27,246,470	40	2,355,349	58,767,856
Iowa	24,899,738	85	N/A	117,060,867
VPI	20,463,088	143	3,608,421	84,900,000
Houston	19,108,479	53	1,907,305	61,241,013
Maryland	18,642,335**	N/A	1,228,200	61.936,568
Rutgers	16,755,066*	146	1,022,991	108,310,522
ARIZONA STATE	16,139,325	56	824,285	21,928,588
Pittsburgh	14,680,607*	41*	500,414	198,129,717
Connecticut	12,319,523	129	864,481	13,883,662
Oklahoma State	12,042,330	31	1,363,392	N/A
New Mexico	7,750,492	53	2,308,603	31,508,898
SUNY-Buffalo	7,379,166	108	N/A	124,884,048
AVERAGE	20,738,376	82	1,829,994	91,943,321

* 4 year average
** 3 year average

FIGURE 10

PACIFIC-10 CONFERENCE PEERS

Institution	Avg. Yearly Fund Raising 1983-87	% inc.	Funds Per FTE Fund Raiser	Endowment-Market Value-1987
Stanford*	$198,534,823	75	$2,647,130	$1,839,490,485
Southern Cal*	91,203,534	55	1,658,246	401,170,611
Washington	77,687,223	23	3,377,705	232,420,000
UC-Berkeley	63,996,262	23	2,782,446	N/A
UCLA	58,467,963	60	974,466	N/A
ARIZONA	37,685,588	16	2,355,349	58,767,856
ARIZONA STATE	18,546,430	22.5	824,285	21,928,588
Oregon State	17,598,440	15	1,173,229	25,637,379
Washington State	16,257,250	17	956,308	222,948,230
Oregon	10,956,819	28	391,314	31,380,813

institutions only to hold their own. They have not experienced gains relative to their peers.

ASU

ASU completed a five-year capital drive, The Campaign for ASU, on June 30, 1988. This was the first capital campaign in the university's history and was inaugurated during the centennial of the institution's founding. The Campaign exceeded its original $75 million goal and raised over $114 million which has been earmarked for endowed scholarships, chairs and professorships, academic programs and various other projects.

The following programs were funded through the campaign:

o **Scholarships, $12 million**

The Campaign for ASU has created more than 100 endowed scholarships, with endowments ranging from $10,000 to $1 million.

o **Chairs and Professorships, $10.5 million**

The Campaign has resulted in gifts and pledges totaling $7 million that will lead to the creation of seven endowed chairs in public policy,

FIGURE 11

NORTHERN ARIZONA UNIVERSITY PEERS

Institution	Avg. Yearly Fund Raising 1986-87	# Staff	Funds Per FTE Fund Raiser	Endowment-Market Value-1987
Delaware	$10,570,835	8	$1,321,354	$258,926,000
Vermont	8,916,624	12	743,052	66,179,000
Ohio	6,136,762	5.5	1,115,774	54,640,326
Miami	5,977,641	5	1,195,528	39,012,623
Cal St.-Fresno	4,639,122	4	1,159,780	9,658,802
Ball State	4,372,472	6	728,745	20,011,901
Bowling Green	4,120,285	5	823,057	13,155,194
Wyoming	3,992,618	6.5	614,249	47,329,000
UN-Reno	3,855,139	5	771,027	28,757,859
NAU	3,608,130	5	721,626	2,901,753
George Mason	3,035,676	5	607,135	2,114,086
Oakland	3,024,669	3.5	864,191	2,672,000
Central Florida	2,404,008	1	2,404,008	8,579,688
Old Dominion	1,990,708	10	199,071	16,573,318
AVERAGE	4,760,335	5.8	820,747	40,750,825

fine arts, liberal arts and other disciplines, including a Centennial chair that is to be designated by the president. Gifts and pledges totaling $3.5 million will enable the creation of 11 new endowed professorships in business, law and other areas.

- **Land, Construction and Buildings, $30 million**

  The Campaign has contributed substantially to the acquisition or construction of: the Fine Arts Complex; the Applied Sciences Building; Fletcher Library at ASU West Campus; the Law College expansion; the new Intercollegiate Athletics Building (at Sun Devil Stadium); renovation of the Fine Arts Annex; the ASU golf course; and Kerr Cultural Center.

- **Academic Programs, $25.5 million**

  Gifts and pledges have been raised to support the Flinn Lecture Series; six new teaching and service centers in the Seidman Institute in the College of Business (First Interstate Center for Services Marketing, Lincoln Center for Ethics, Hahn Center for Entrepreneurship, Center for Financial Systems Research, Arizona State Real Estate Center, Economic Outlook Center; the Cronkite Endowment; and the Engineering Excellence programs.

- **KAET, $12.5 million**

  The Campaign has raised more than $1.3 million in gifts and pledges for the KAET Endowment, and more than $10.7 million (as of April 15) for operations.

- **Teaching and Research Equipment, $10 million**

  Beneficiaries of The Campaign include the Center for Meteorite Studies and the Engineering Excellence Program, both of which received substantial donations of computers, laboratory equipment and other aids.

- **Disabled Students, $1 million**

  Gifts and pledges totaling more than $1 million have been designated for resources to help disabled students at ASU, including a scholarship bequest of more than $500,000.

- **General Operations, $12.5 million**

  Unrestricted monetary and in-kind gifts have been used for annual awards, graduate and teaching support, special projects and various friends and community support groups.

In addition, The Campaign for ASU has enhanced such valuable support organizations as the Dean's Council of 100 in the College of Business, the Economic Club of Phoenix and the Accounting Circle; the Council for Design Excellence in the School of Architecture; the Sundome Friends; ASU Friends of Music and ASU Library Associates.

Other specific gifts have included many works of art for the University Art Collections and a new broadcast van for KAET-TV.

UA

The University of Arizona is in the midst of its first comprehensive fund raising campaign in the university's history, the Century II Capital Campaign. The Campaign began in November, 1987 and will conclude December 31, 1992. To date, over $57 million has been received or pledged toward the announced goal of $100 million.The following programs will be funded through the Campaign:

- **Faculty Support, $15 Million**

  University Endowed Chairs,

  Distinguished Professorships,

  Visiting Professorships and

  Junior Faculty Development.

- **Student Support, $15 Million**

  Undergraduate Scholarships:

  Minority Scholars,

  Arizona Scholars,

  National Merit Scholars,

  University Scholars and

  Old Main Scholars;

  Graduate Fellowships:

  Corporate Partnership Fellows,

  Minority Fellows and

  Graduate College Fellows; and Dissertation Awards.

- **Special Research & Educational Programs: Endowment Opportunities, $20 Million**

INTERDISCIPLINARY PROGRAMS

The Arizona Institute for the Study of Complex Systems,

Arizona Research Laboratories (Divsion of Neurobiology)

The Biotechnology Center,

The Center for Insect Science,

674

The Center for Southwest Studies,

The Center for Toxicology,

The Desert Laboratory,

The Roy P. Drachman Institute for Land and Regional Development Studies,

The Environmental Research Laboratory and

The Udall Center for Studies in Public Policy.

COLLEGE AND LIBRARY PROGRAMS

Agriculture,

Architecture,

Business and Public Administration, Education,

Engineering and Mines,

Fine Arts,

Health Sciences,

Humanities,

Law,

Library Collections,

Science and

the Social and Behavioral Sciences.

o **NEW FACILITIES AND EQUIPMENT, $42 MILLION**

Mount Graham Observatory and Telescopes,

Business and Management Building, Student Recreation Center,

University Heart Center,

Children's Research Center,

Museum of Art,

Agricultural Biotechnology Building,

Department of Intercollegiate Athletics (Tennis Facilities and McKale Swimming Pool)

Equipment and

Concert Pipe Organ

o **Alumni Endowment, $5 Million**

o **Campus Enhancement, $3 Million**

NAU

NAU began its first capital campaign in 1987 with the inauguration of the Campaign for Old Main. The stated purposes of the Campaign are to provide financial support for the restoration of Old Main, to strengthen the liaison with alumni and friends, and to enhance the public image of the university. The goal is to enlist $500,000 in cash contributions and pledges by August 31, 1989. Total revenue pledged or paid as of August, 1988 is $126,439. The Campaign will be announced publicly when at least half of the goal is in-hand or pledged.

The case statements for all three campaigns note that at significant times in the past, contributions by private donors have provided the initial impetus or financial leverage necessary to accelerate the growth of the institutions' finest and best known programs. It is clear that gifts obtained through these campaigns will continue that tradition. Perhaps more importantly, their successes will thrust them into the same fund raising echelon of institutions they have sought to compete with academically. The ASU and UA campaigns have clearly accomplished a number of goals which can help ensure their long term fund raising success:

1. The campaigns have refined or built comprehensive development programs with skilled staffs of professionals.

2. The campaigns have strengthened annual fund programs and refined major gifts programs that will continue following the campaigns' conclusions.

3. The campaigns have greatly expanded the institutions' bases of donors and trained volunteers.

4. Development plans integral to the academic missions of the institutions have been formulated.

5. Baselines have been developed for future strategic planning for the development programs in conjunction with university strategic plans.

6. The campaigns have rejuvenated and expanded the ASU and UA Foundation board of directors and strengthened their commitments to the universities.

STATE PARTNERSHIP MATCHING PROGRAMS

The resources required by the Arizona universities to continue to move up in national prominence are substantial. Hiring the best faculty and recruiting the best students is a competitive challenge with many public institutions that are raising large sums of private dollars to supplement state resources. Over the past decade there has been a growing national legislative trend in appropriating state funds to leverage additional private support to public universities. Typically these programs match private funds on a formula basis to establish endowed chairs and professorships. It appears that the next phase of these programs will expand to other program priorities such as scholarships and equipment. The details outlined in the Florida program noted later in this paper are typical of most efforts.

The rationale for these programs is now well-settled:

1. It is no longer possible for a university to attain excellence in a program strictly through state appropriations.

2. One method of assuring an excellent program is to attract excellent faculty. Top faculty are continually sought by other institutions. Attracting and retaining the best faculty requires competitive salaries, support personnel and equipment which often cannot be funded solely by state resources.

3. State matching fund programs demonstrate to potential donors that their gifts form a partnership with the state and their investment will be leveraged for a more significant impact. The programs also enable donors who are unable to fund an entire chair or professorship to meet university needs with the help of the state.

4. Adoption of the programs send a message to the universities and the public that the legislature is making a stronger commitment to fund excellence in its public institutions.

In the spring of 1988 a national survey of such programs was completed to document, for the first time, the scope of state matching funds efforts. The survey results showed that nearly sixty percent of the state legislatures now provide or will soon provide funds to match private gifts for endowed chairs at state universities.

Alabama

A $9 million state allocation to the state's eminent scholars initiative in 1985 has resulted in the creation of a $22.6 million fund through late 1987. The program makes state grants of $400,000 available to universities that secure private donations of $600,000. Twenty-five private gifts have been matched with an additional ten gifts waiting to be funded by the state.

Alaska

No formal matching funds programs exist. The concept of a program is being discussed within the system.

Arizona

In 1983 the state legislature amended the state land fund statute to permit matching funds for the interest earned on private funds donated to attract and retain eminent faculty in the disciplines of engineering, mathematics and science. To date there have been no program disbursements.

Arkansas

No formal matching funds programs exist. In January, 1989 the Board of Regents will proposed legislation to establish a $10 million fund for endowed chairs and professorships, research equipment and faculty development.

California

No formal matching funds programs exist.

Colorado

No formal matching funds programs exist.

Connecticut

In 1985 the legislature established an Endowed Chair Investment Fund. The state matches $500,000 private gifts on a dollar-for-dollar basis. The chairs must be located within Centers of Excellence as chosen by the universities.

Delaware

No formal matching funds programs exist.

Florida

The Eminent Scholars Program was created in 1979. The state contributes $400,000 for each $600,000 raised through private donations. A new program provides for increasing state matching funds for chairs up to a maximum 100% match for a $2 million gift.

In 1986 the legislature approved a Trust Fund for Major Gifts which provides for a fifty percent match of $100,000 private gifts for endowed professorships, library

677

resources, scientific and technical equipment and scholarships.

In 1986 the legislature also approved a Trust Fund for New Donors which provides a $10 endowment grant for each new donor of $20 or more to a university. Funds can only be expended for support of academic programs, nonathletic scholarships or libraries.

Georgia

The Georgia Eminent Scholars Endowment Trust Fund was adopted by the legislature in 1985. A sum of $1 million or more is required to endow a chair which requires three private dollars for each state dollar match. More than one donor can contribute to a chair.

Hawaii

No formal matching funds programs exist.

Idaho

No formal matching funds programs exist.

Illinois

No formal matching funds programs exist.

Indiana

In 1985 the legislature approved endowment funds for 24 distinguished professorships at Purdue University which must be matched equally by private donations. In 1987 the legislature appropriated an ongoing program to fund 5 distinguished professorships including support costs.

Iowa

In 1987 the legislature approved the use of a portion of state lottery revenues for grants to encourage research at public and private universities in the state. One type of eligible project is the endowment of faculty chairs in selected areas. In the first year, six grants were awarded for endowments of $500,000 and up which must be matched dollar for dollar from university, private, foundation or other sources.

Kansas

No current matching funds programs current exist.

Kentucky

The state legislature has provided funding for five endowed chairs at the state universities which required a match from private gifts.

Louisiana

In 1983 the legislature approved the creation of an Endowment Trust Fund for Eminent Scholars. The Act directs that the Board of Regents allocate the grants of $400,000 for each $600,000 gift received. Only the interest may be expended.

Maine

No formal matching gifts programs currently exist.

Maryland

The Board of Regents anticipates requesting funds from the legislature for programs in the next two years.

Massachusetts

No formal matching funds programs exist.

Michigan

No formal matching funds programs exist.

Minnesota

A proposal for the establishment of a matching funds program is before the legislature.

Mississippi

No formal matching funds programs exist.

Missouri

A proposal for the establishment of a matching funds program is before the legislature.

Montana

No formal matching funds programs exist.

Nebraska

No formal matching funds programs exist.

Nevada

Within the last two years the legislature has transferred refunds on estate taxes to the universities and K-12 system for incentive programs. The universities may apply for matching endowment funds for chairs.

New Hampshire

No formal matching funds programs exist.

New Jersey

The state currently contributes to the endowment of five chairs through a total appropriation of $335,000.

New Mexico

In 1984 the legislature established a Higher Education Endowment Act which appropriated $5.5 million for endowments for chairs, professorships, lectureships and graduate fellowships. Grants under the Act must be matched dollar for dollar by private gifts.

New York

In 1983 the legislature established a program for high technology skills training which matches corporate gifts. The state legislature does not current provide matching funds for endowed chairs but has funded ten Distinguished Regents Chairs at $100,000 each since 1964 which are competitively awarded to the state's public and private institutions.

North Carolina

In 1985 the legislature approved a Distinguished Professors Endowment Trust Fund. Each institution must raise $334,000 or $666,000 in donations to qualify for one-third additional matching funds. Sixteen positions are being created from the initial funding cycle.

North Dakota

During the 1989 legislative session the state universities will seek $3 million for Partnerships to Enhance Academic

Quality. The program will seek proposals which cross institutional lines, which seek to improve academic quality and which offer the strongest potential for matching funds from private sources. Institutional proposals are now being readied in anticipation of funding.

Ohio

In 1984 the legislature established the Ohio Eminent Scholars Program with a $4.5 million appropriation. A $500,000 award of state funds must be matched by an equal amount of university funds which may be private gifts. Eighteen chairs were established in the first two years.

Oklahoma

The Board of Regents has submitted legislation for the establishment of an eminent scholars and centers of excellence program and funding in the amount of $20 million. The program would required a dollar for dollar match from the private sector.

Oregon

No formal matching funds programs currently exist.

Pennsylvania

No formal matching funds programs currently exist.

Rhode Island

No formal matching funds programs currently exist.

South Carolina

The Commission on Higher Education has requested state matching funds for endowed chairs in its upcoming budget.

South Dakota

The legislature provides matching money for research equipment purchases. A proposal for challenge funds to match gifts for endowed chairs is currently before the legislature.

Tennessee

The Tennessee Chairs of Excellence Program is currently funded at a level of $30 million. Institutions are required to match the grants with private funds of an equal amount.

Texas

From 1981-1983 the legislature appropriated matching funds for private gifts for endowed chairs, professorships, fellowships and lectureships. Following the expiration of the program the Board of Regents continued the program with a two-for-one match. That program has now expired. In 1987 a scholarship endowment matching program was created with requires a $25,000 gift which will be matched two-to-one.

Utah

In 1986 the legislature began funding the state's Centers for Excellence Program which was modeled after the National Science Foundation's University-Industry Cooperative Research Centers Program. University-based researchers are invited to make proposals to establish a center of cooperative interdisciplinary applied research and development. Specifying the areas of research, the nature of industrial support and the expected impact on the Utah economy is required. Each center must attract at least two dollars from private or federal sources for every dollar of state funds received and must develop a plan to become self-supporting within three to five years. To date twenty-two centers have been approved. One hundred and twenty-two companies have provided matching funds and early results show that $15.40 in private dollars have been provided for each state dollar.

Vermont

No formal matching funds programs currently exist.

Virginia

In 1964 the general assembly established the Eminent Scholars Program which provides for salary supplements funded from endowment income and matching general fund appropriations. The highest matching rate achieved in state funds has been dollar for dollar. For 1988-89 the appropriation is $5.6 million.

Washington

In 1985 the legislature enacted the Distinguished Professorship Trust Fund Program which provides a matching grant program to assist institutions in creating endowments for professorships. An initial $750,000 appropriation created three positions which was supplemented in 1987 with a $5 million appropriation for twenty additional positions. An institution may request a position when it has raised $250,000 which will then be matched with a like amount from the state.

West Virginia

In 1985 the legislature established the Eminent Scholars Trust Fund, a corporation whose board is composed of the members of the Board of Regents. The Corporation is authorized to receive appropriations of public money as well as public or private grants, gifts or bequests. For 1985-86 the state appropriated $100,000 to match private gifts for endowed chairs up to a dollar for dollar match to reach the $150,000 requirement for each salary supplement. An additional Distinguished Professorship Trust Fund bill is currently pending in the legislature.

Wisconsin

In 1986 the legislature approved funding for the Applied Research Program which is designed to foster research having ultimate benefits to the state's economy. A sum of $200,000 was appropriated as matching funds with a $40,000 limit on each project unless private matching funds are obtained. In addition a Wisconsin Distinguished Professors Program has been established which recognizes contributions to the state's economy and requires $25,000 in private support annually to be combined with a $250,000 match from the state.

Wyoming

No formal matching gifts programs currently exist.

THE FLORIDA EXPERIENCE

With sixty percent of the states adopting or on the verge of adopting state matching programs, it is somewhat problematic to single out any given program for evaluation. However, following discussions with several state higher education executives, it is clear that Florida is viewed as the leader in such programs. Florida has nine public four year institutions: University of Florida, Florida State, Florida A&M, University of South Florida, Florida Atlantic, University of West Florida, University of Central Florida, University of North Florida and Florida International. Enrollments range from 5,000 to 36,000.

A three year legislative process concluded in 1979 with the passage of the state's first Eminent Scholars Act and an initial $500,000 appropriation. The two stated purposes for the Act were "to strengthen the universities by making it possible to add distinguished scholars to their faculties; and to promote future excellence in the state universities by stimulating private support from both citizens and organizations." By the end of 1988 the total state investment in partnership programs will reach $48,588,426, with ninety percent of that funding for the Eminent Scholars Act.

Under the Act an endowed chair in the amount of $1M may be established when a Florida university Foundation raises at least $600,000 in private funds and those funds are matched by $400,000 from the Florida Endowment Trust Fund for Eminent Scholars, the repository for the state appropriations and lottery proceeds which fund the programs.[Florida has nine public four year institutions: University of Florida, Florida State, Florida A&M, University of South Florida, Florida Atlantic, University of West Florida, University of Central Florida, University of North Florida and Florida International. Headcount enrollments range from 5,000-36,000.]

Under subsequent legislation, a sliding scale matches gifts of up to a maximum of $1M, which receives a $1M state match. A donor may pledge the minimum $600,000 over a five year period. The university can encumber the matching funds upon receipt of the first $100,000 with the balance due in five years. A report from the State Auditor General noted that the average payment of deferred pledges was sixteen months. The state returns the interest earned on appropriated funds not yet encumbered to the program which has resulted in additional funds for twelve chairs.

Once the private funds are in hand, the entire amount is transferred to the applicable university foundation to be administered by their board for the support of the Eminent Scholars Chair. There are no restrictions as to the nature of contributions except that they must be converted to cash for the foundation to request the release of state funds. There are no state restrictions upon the foundation or a university with reference to the naming of the chairs. Funds are generally utilized for salaries, graduate assistants, office renovation and computer time and supplies.

There can be no question that the Eminent Scholars Act has proven to be successful. As of February 29 a total of 133 chairs had been fully funded, encumbered or were in progress (Table 12). Funds are available to each campus on a "first come, first served" basis which has resulted in the seven smaller campuses receiving forty-five percent of the chairs. Medicine and business have received forty-six percent of the funded and encumbered chairs but seventeen other disciplines have also received chairs (Table 13). There is currently a waiting list to match pledges received by donors.

Florida officials believe the programs have achieved one intended goal of developing an increased recognition around the country that the Florida universities are serious about becoming one of the best systems in the country. A recent U.S.News and World Report poll of higher education officials listed the Florida system as one of the top ten systems in the country, a fact which Florida officials see as symbolic evidence of their message being received.

The program has resulted in increased gifts to the university as evidenced by the fact that each campus has met the mandate of the statute which requires that in order to participate in the program, each campus must receive contributions for other purposes which meet or exceed the total average level of contributions made in the three years prior to the inauguration of the program. Indeed the campuses report that most of the over $50,000,000 donated to the program has been from donors not previously contributing to the universities. Florida university officials report that the fund investment responsibilities assigned to the university foundations have revitalized their boards, which are responsible for maximizing the endowment income available for the chairs.

The major problem facing the program has been the filling of funded positions. Forty-five percent of the first sixty-six are were not filled as of February 29 (Table 14). Florida Board of Regents officials attribute this situation to several factors. The intent of the program is to attract nationally and internationally acclaimed scholars which is a difficult, long term process. It is anticipated that many cultivation efforts will take two to three more years. The program is not intended to retain current faculty as there are other programs with that goal. It is anticipated that additional campus construction will solve the lack of laboratory space which has hindered search efforts. Finally, the endowment incomes have not always been sufficient to provide a sufficient salary add-on to attract the best candidates. The $2M "Super Chair" matching fund was created to solve that problem.

Encouraged by the success of the Eminent Scholars Program the legislature created a Major Gifts Program in 1985. The objective of the program is to create endowments to for professorships (support for faculty lines already created), library resources, scientific and technical equipment and scholarships other than athletic. This program has been funded with $4,000,000 in out-of-state tuition revenue. As of February 29, 1988, the state universities had received pledges to qualify for ninety-eight matching grants under the program (Table 15). Thirty-nine percent of the initial grants have gone to the two largest universities. The majority of the early grants were for scholarships/fellowships and endowed professorships in the arts and sciences, business and areas designated by the universities themselves (Table 16). University development officers believe that a significant benefit of the program is that funds can be raised by colleges and departments that are not high on the list for improvement through state appropriations.

Also in 1985 a Trust Fund for New Donors was established by statute. This fund provides $10 to each university for every new donor gift of $20 or more. Funds are placed in a restricted endowment to be expended exclusively for the support of academic programs, nonathletic scholarships or libraries as determined by each university president. As of June, 1987 the universities had received qualifying gifts from 33,562 new donors (Table 17). The intent of the program is to develop a tradition of giving among younger alumni, many of whom will contribute significantly in later years.

It is estimated that approximately 150 endowed chairs have been established nationally through state matching programs. It is estimated that another 500 chairs may be established in the next ten years. The primary Arizona response to this competitive challenge has been twofold. As noted earlier, in 1983 the Arizona Legislature amended ARS 15-1663 to provide for a matching grant fund which consists of the "annual income from the universities' land fund in excess of the amount of the base fund" for endowed chairs in certain disciplines. However, because those funds would otherwise be utilized for university base budgets, the bottom line of the program is a "zero-sum game" and no funds request from any of the universities has been made to date.

Second, in 1986 the Board of Regents approved the title, Regents Professor, to designate scholars of exceptional ability who have achieved national and international distinction. The title can only be granted to tenured faculty members who already hold the title of professor at one of the three institutions and is limited to no more than one percent of the number of full-time and tenure-track faculty. Regents professors receive a $5,000 salary increment added to their base salary and an annual $10,000 stipend for scholarly activities. While the program will assist the universities in retaining top faculty, it does not provide for resources to attract top out-of-state scholars nor does it assure that other states will not successfully recruit our top faculty through higher compensation and academic support from their state matching fund endowments.

CONCLUSIONS

1. Arizona's public universities have made significant recent strides to strengthen their private fund raising efforts which are beginning to develop a tradition of contributing to public higher education in Arizona.

2. All three universities lag significantly behind their peer institutions in fund raising success. The evidence suggests this is the result of a relatively late start in comprehensive fund raising efforts and a lack of a strong philanthropic tradition that exists in other regions of the country but has yet to develop in Arizona.

3. The expansion of state matching gift programs is a significant trend that may make it more difficult for Arizona universities to attract and retain scholars with national and international reputations.

4. Insufficient state funds exist to fund all universities' yearly requests for new or expanded programs. (See Task Force working paper, Arizona University Program Changes: Nine Year Summary: FY 1981-FY 1989, Caldwell, Roger). A partnership opportunity exists to match state investments with private funds in high priority programs to maximize the total state funds available for those programs.

5. The development staffs at the three universities have become increasingly productive the last five years. The increased use of state supported lines for staff rather than local or other funds would permit the universities to develop long range staffing plans.

RECOMMENDATIONS

- The Arizona Legislature should establish an Eminent Scholars Trust Fund that would match private gifts with new state funds on a formula basis to create endowments for selected eminent scholars in priority areas of emphasis and fund necessary equipment and support for them.

- The Arizona Legislature should also establish a Major Gifts Trust Fund that would match private gifts on a formula basis with new state funds for the enrichment of key university programs in areas such as professorships, library resources, scientific and technical equipment and scholarships. The Board should seek assurances from the Legislature that appropriations for these two Trust Funds would not come at the expense of current and increased appropriations for other university programs. Alternatively, the Board should seek funding for the Trust Funds from alternative sources, such as lottery funds.

- Members of the Board of Regents should take a more active role, when requested and where appropriate, in fund raising solicitations on behalf of the universities.

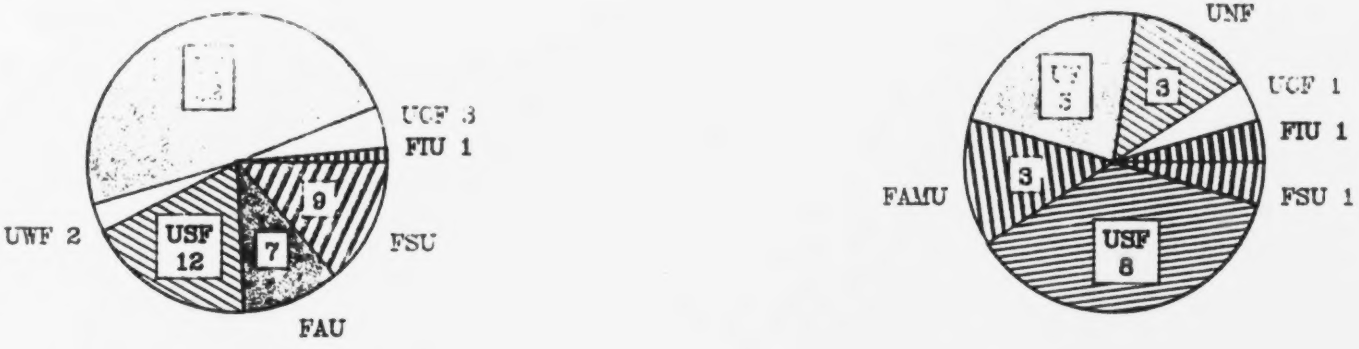
- The universities should continue to increase the size of their development staffs and increases should be funded through state appropriations whenever possible.

TABLES AND FIGURES

TABLE 12

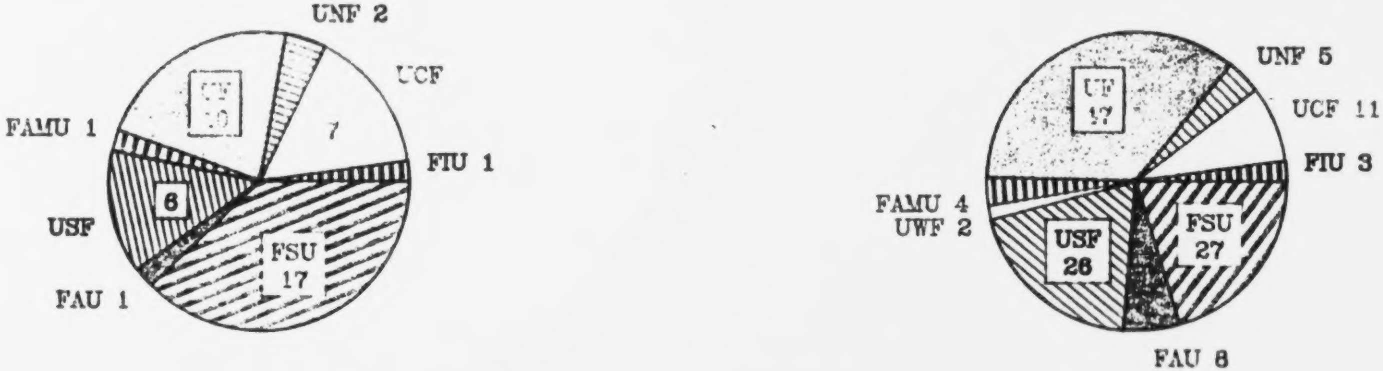
SUMMARY
EMINENT SCHOLARS PROGRAM

February 29, 1988



FULLY FUNDED - 66

ENCUMBERED - 22



IN PROGRESS - 45 *

TOTAL - 133

* 14 IN PROGRESS WILL BE ENCUMBERED UPON RECEIPT OF LOTTERY PROCEEDS

TABLE 13

EMINENT SCHOLARS PROGRAM
Fully Funded and Encumbered Endowed Chairs
By Discipline
February 29, 1988

DISCIPLINE	CHAIRS
Agriculture/Agribusiness	7
Architecture	2
Business	24
Communications	2
Computer and Information Sciences	1
Dentistry	1
Education	2
Engineering	4
Home Economics	1
Law	6
Liberal Arts	2
Life Sciences	4
Medicine	23
New College	1
Nursing	3
Pharmacy/Pharmaceutical Sciences	1
Social Sciences	9
Veterinary Medicine	2
Visual and Performing Arts	7
TOTAL	102

TABLE 14

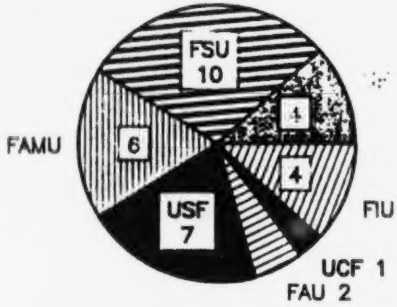
EMINENT SCHOLARS PROGRAM
Fully Funded Endowed Chairs
By Discipline
February 29, 1988

DISCIPLINE	CHAIRS FUNDED	CHAIRS FILLED
Agriculture/Agribusiness	5	3
Architecture	1	0
Business	14	8
Communications	1	1
Computer and Information Sciences	1	1
Education	1	1
Engineering	3	1
Home Economics	1	1
Law	4	0
Liberal Arts	2	1
Life Sciences	3	3
Medicine	17	7
Nursing	3	0
Social Sciences	4	3
Veterinary Medicine	1	1
Visual and Performing Arts	5	5
	FUNDED	FILLED
TOTAL	66	36

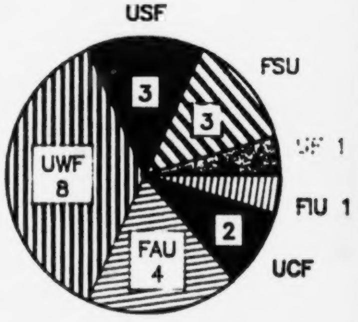
TABLE 15

SUMMARY
MAJOR GIFTS PROGRAM

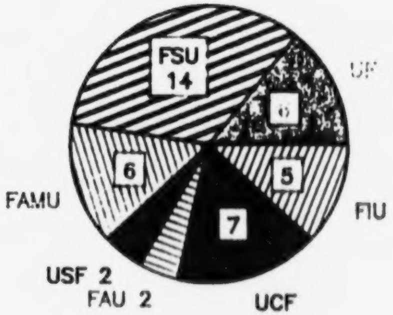
February 29, 1988



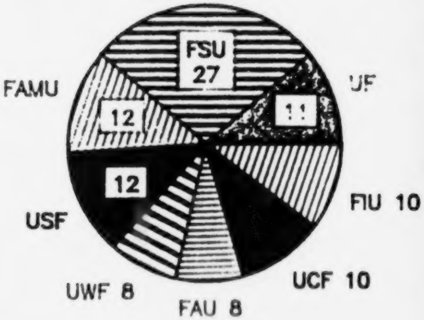
MATCHED - 34



ENCUMBERED - 22



* IN-PROCESS - 42



TOTAL - 98

* IN PROCESS INCLUDES 18 AWAITING ENCUMBRANCE AUTHORITY

TABLE 16

MAJOR GIFTS PROGRAM
Number of Funded Grants
February 29, 1988

BY ACADEMIC AREA

Arts and Sciences	9
Business	10
Music	2
Undesignated	10
Nursing	1
Building Construction	1
Rotate Among Disciplines	1
TOTAL	34

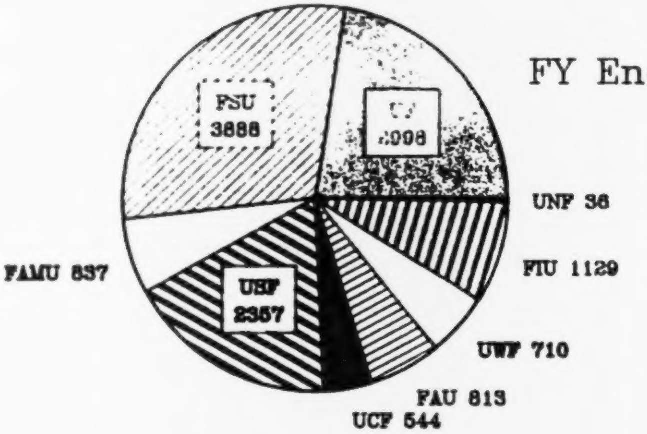
BY PURPOSE

Endowed Professorships	11
Scholarships/Fellowships	19
Library Resources	1
Equipment	3
TOTAL	34

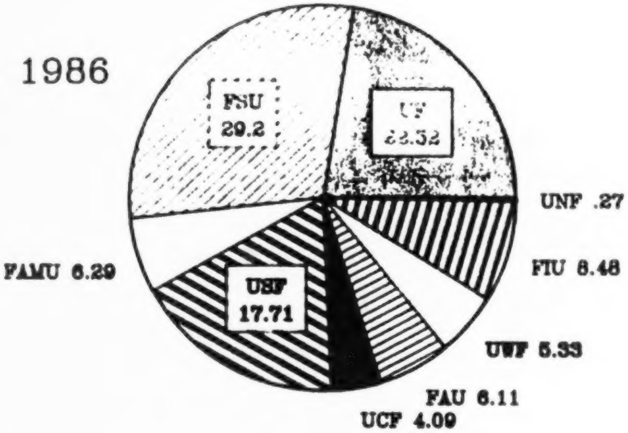
TABLE 17

SUMMARY
NEW DONORS PROGRAM

FY Ending June 1986

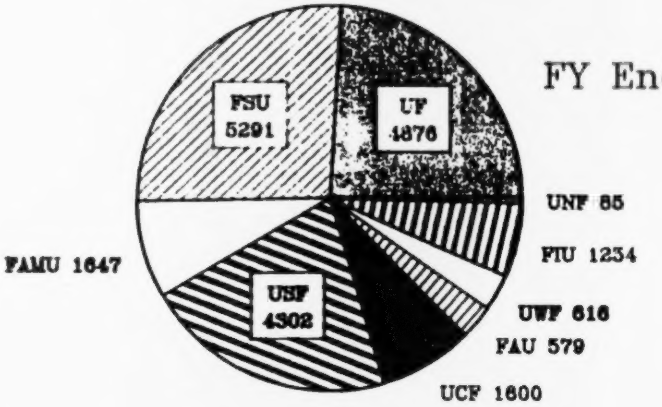


NUMBER OF DONORS - 13,312

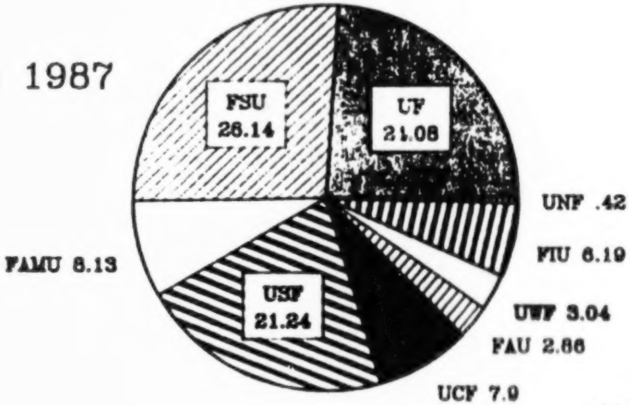


PERCENT OF TOTAL

FY Ending June 1987



NUMBER OF DONORS - 20,250



PERCENT OF TOTAL

RECRUITMENT AND RETENTION OF FACULTY, "AN IMPERILED NATIONAL RESOURCE"

GEORGE H. DAVIS

ABSTRACT

The bulk of the faculty in U.S. colleges and universities must be replaced in the next twenty-five years, and there is a shortage of new and emerging capable academicians in the pipeline. 60% of the faculty presently employed at the three Arizona universities will reach age 65 by 2010. An immense challenge presents itself to replace Arizona university faculty at a rate, beginning ten years from now, of at least 100 faculty members per year.

In assessing our competitiveness in recruiting and retaining outstanding faculty, we asked faculty members at the three Arizona universities:

1) what factors prove to be real advantages to your institution in the recruitment and retention of good faculty?, and
2) what factors prove to be obstacles that tend to get in the way of successful recruitment and retention?

Here are the perceptions:

The quality of life in Arizona works to the advantage of faculty recruitment and retention at each of the three universities. The economic forecast for Arizona is strong compared to most other states, and this gives confidence to faculty candidates that resources will be available to accomplish programmatic goals. Recruitment is hampered, however, because of the lack of serious commitment to elementary and secondary education: the state's investment in "K through 12" public education ranks 46th in the nation. Reports of inadequate to uneven quality in the public K-12 sector are a liability in recruitment and retention of faculty candidates with families.

The University of Arizona has a significant core of high quality faculty and department heads with a serious, "can do" attitude, and this enhances recruitment and retention. Excellent interdisciplinary cooperation also benefits UofA in its recruiting efforts. Arizona State University is the only university in a city of two million people, thus enjoying an unchallenged competitive position of a type that exists nowhere else in the nation. At Northern Arizona University the faculty/student interaction is very close and supportive, and this creates an academic environment which is appealing to faculty and which enhances recruitment and retention.

The ability to consistently hire and retain quality faculty in the requisite numbers depends upon availability of space, capital equipment, and technical staff

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George H. Davis joined the faculty of the University of Arizona's Department of Geosciences in 1970, following PhD studies at the University of Michigan. His research and teaching have centered on the nature and origin of structures in mountain belts. Davis' undergraduate textbook, Structural Geology of Rocks in Regions, has extended his reach as a teacher to students outside of Arizona in other parts of the country and the world. He also served as Head of the Department of Geosciences and and serves as Vice Provost for Academic Affairs at UA.

support. The more these assets are available, the greater the recruitment success attainable. Department heads and faculty worry that new space is not being made available at a pace consistent with mission-driven programmatic plans and goals. Remodeling of old space is slow and overpriced. Capital equipment needs for teaching, performance, and research are simply not being met by the present combination of state-funding, grant support, and foundation/gift support.

Faculty and department heads at all three universities believe that there is just too much paperwork and too many committee assignments. The extra work created makes it more difficult for faculty and department heads to find time for their first-order responsibilities, and this affects retention. Some argue that too much reliance on statistics, forms, and decision-making by committee stands in the way of timely action, and these factors result in programmatic delays and missed opportunities, including missed recruitment opportunities.

1988 salary data reveal that the Arizona universities are about average in national competitiveness: Arizona State University and the University of Arizona are at or slightly above the national average for the category "Doctoral Institutions;" salaries of assistant professors and associate professors at Northern Arizona University are ahead of the national average for the category "Comprehensive Universities," but professor salaries are slightly behind. The salary levels for Northern Arizona University faculty, regardless of rank, are much more competitive with national averages for Comprehensive Universities than are salaries for Arizona State University and University of Arizona faculty with respect to averages for Doctoral Institutions.

When salary data for the past twenty-six years are examined, the trends are not very encouraging. Salaries for Arizona university faculty in the 1980s have not been nearly as competitive, nationally, as they were in the 1970s. We have fallen behind. The radical fluctuations that have distinguished the comparative salary data for the Arizona universities in the 80s account for the low level of confidence currently held by department heads and faculty that we can "remain" competitive, nationally. Budget cuts and the breakdowns of the annual salary adjustment cycles clearly have taken their toll.

Women and minorities are relying on Presidents and Academic Vice Presidents to exert much more influence on affirmative action recruitment and retention. Through the resources they control, the Presidents and Academic Vice Presidents have the power to bring about change.

RECOMMENDATIONS

To maintain our strengths and reduce those factors that interfere with successful recruitment and retention, we recommend that the following be assigned high priority by the Arizona Board of Regents, Board Staff, and University Presidents.

- o Seek ways to increase the level of technical staff and capital equipment support.
- o Review classroom/laboratory remodeling procedures and practices, and modify the approach in ways that will be faster and cheaper without undercutting quality.

- Seek ways to accelerate the schedule of new building construction.
- Engage in a war on paperwork and committee proliferation, at all levels, through elevated consciousness of the value of people's time.
- Set goals regarding national competitiveness of faculty salaries, and work to bring about the level and consistency of funding required.
- Bring more commitment and resources to bear on the recruitment and retention of women and minority faculty.

FACULTY, THE ESSENTIAL INGREDIENT

The academic well-being of any institution of higher learning resides with the quality and integrity of its faculty. Faculty are the essential, central element in the structure of a university. They determine what is to be taught, whether it be the contents of a single course, or the overall course requirements of a departmental (or college) curriculum. They establish standards for performance. They influence the career choices of students. They are mentors to graduate and professional students. They open up new horizons, new ways of thinking, new technologies, and new modes of artistic expression, through communicating the fruits of their research, scholarship, and creative endeavors. They make hiring decisions. They evaluate faculty performance. They judge promotion and tenure. They are involved in governance at all levels. They represent the university to the community and to the state. They are asked to carry out research and scholarship for the state and nation.

Most of the important measures of university productivity are driven by faculty performance: for example, numbers of graduates, quality and preparedness of graduates, levels of external funding (i.e., grants and contracts), successes in graduate recruitment, discoveries of new knowledge and/or new technologies, impact of books, articles, performances, and exhibits, and quality of public outreach. Universities compete for the finest faculties, knowing full-well the payoffs in the classroom, in the research arena, and in the public sector.

Furthermore, the finest faculties may more consistently make wiser judgments in making decisions that affect the academic life of the institution.

Even under normal circumstances, one of the most important responsibilities of academic leadership lies in hiring good faculty, creating an environment which supports to full measure the professional growth and development of faculty, and in judging who should or should not be promoted and given tenure. Managing these responsibilities becomes even more crucial under abnormal circumstances, of the type that now are already in view on the horizon. "The academic profession is an imperiled national resource" (Schuster, 1986).

PROJECTED NATIONWIDE SHORTAGE OF FACULTY

The bulk of the faculty in U.S. colleges and universities must be replaced in the next twenty five years (Watkins, 1986), but there is a shortage of new and emerging capable academicians in the pipeline. Authorities are concluding that it will be enormously difficult in the period

1995-2005 to attract a sufficient number of outstanding individuals into faculty positions (Schuster, 1986).

Pushed by the baby boom, the number of full time faculty increased from 163,000 in 1960 to 369,000 in 1970 (Schuster, 1986). Presently there are approximately 450,000 full time faculty in the nation. It is estimated that two-thirds of these faculty will retire by the turn of the century. Conservatively, Bowen and Schuster (Schuster, 1986) believe that as many as 130,000 new full time faculty will be needed over the next twenty-five years.

Presently there is a relatively small number of openings for full time faculty, and in most fields the competition for these positions is fierce. This, along with such factors as the low level of graduate stipends, has created disincentives for bright and promising scholars to pursue doctoral or professional studies. Many turn instead to lucrative opportunities in the private sector.

The competition for faculty members in the period 1995 to 2005 has already started. Berkeley is borrowing against future vacancies and hiring now. Dartmouth and Columbia have established attractive start-up and salary packages for Assistant Professors. The University of Pennsylvania is investing heavily in research facilities and research equipment, to attract scholars as faculty members (Schuster, 1986).

RETIREMENT PROJECTIONS FOR THE ARIZONA UNIVERSITIES

Table 1 presents a schedule of the approximate number of presently employed faculty at the three Arizona universities who will reach age 65 between 1989 and 2010. For the University of Arizona, 874 faculty members, representing 59% of those presently employed, will reach age 65 by 2010. For Arizona State University, 809 faculty members, or 58% of the faculty presently employed, will reach age 65 by 2010. For Northern Arizona State University, the percentage is even higher: 72%, or 290 faculty members. Overall, 1973 faculty members, comprising 60% of faculty presently employed at the three Arizona universities, will reach age 65 by 2010.

TABLE I

SCHEDULE DESCRIBING APPROXIMATE NUMBER
OF FACULTY THAT WILL REACH AGE 65 DURING
PERIOD 1989 TO 2010

YEAR	UNIV. OF ARIZONA	ARIZ. STATE UNIV.	NORTHERN ARIZ. UNIV.	TOTAL
1989	21	12	2	35
1990	23	18	4	45
1991	26	16	6	48
1992	37	27	11	75
1993	35	19	13	67
1994	45	34	14	93
1995	38	29	13	80
1996	33	36	12	81
1997	45	32	11	88
1998	41	39	16	96
1999	45	38	12	95
2000	40	40	16	96
2001	38	38	13	89
2002	39	32	15	86
2003	41	42	26	109
2004	53	41	13	107
2005	38	44	19	101
2006	48	42	15	105
2007	52	55	20	127
2008	47	49	12	108
2009	45	62	14	121
2010	44	64	13	121
TOTAL	874	809	290	1973
	$\frac{874}{1481} = 59\%$	$\frac{809}{1395} = 58\%$	$\frac{290}{401} = 72\%$	$\frac{1973}{3260} = 60\%$

Although these data may appear more favorable than Schuster's national projections that two-thirds of the present faculty will retire by the end of the century, the conclusion remains the same: an immense challenge presents itself to replace Arizona university faculty at a rate, beginning ten year from now, of approximately 100 faculty per year. This does not take into consideration additional recruitment needs that will arise from enrollment increases and a normal attrition due to adverse tenure decisions, program changes, deaths, early retirements, and non-retention of faculty lured to the private sector or to other colleges and universities.

NATURE OF THIS REPORT

It is timely, we believe, to take stock of the competitiveness of the three Arizona universities in recruiting and retaining outstanding faculty. There is no question that the Arizona universities will be heavily hit by retirements between now and 2005. The Arizona universities run the risk of becoming shopping malls where outstanding established scholars as well as young faculty will be plucked off the shelves by other institutions in search of improving their ranks. Various factors will influence retention:

Is the salary structure of the Arizona universities competitive, and to what degree?

How do faculty feel about their Arizona university?

Do they believe they are supported in their work, and if so (or if not) how might this affect their response to outside offers?

These questions and others will be pursued in this paper, with the ultimate purpose of identifying ways in which the Arizona universities can improve their competitive positions in attracting and retaining outstanding faculty.

THE APPROACH

I interviewed forty-five faculty members at The University of Arizona, Arizona State University, and Northern Arizona University. Each interview lasted approximately one hour. I posed two questions at the start:

1) What factors prove to be real advantages in the recruitment and retention of good faculty?

2) What factors prove to be liabilities or obstacles that tend to get in the way of successful recruitment and retention?

The frame of reference was the home institution, but I also welcomed observations that, in the opinion of the faculty member, might hold for all three of the Arizona universities.

Selection of faculty members to be interviewed was not random. For the University of Arizona I identified individuals representing a broad spectrum of disciplines whose judgement, insight, and academic leadership I have come to value. I asked Professor Kathleen Church (EEC Task Force Staff Member and ASU faculty member) to provide a list of persons at Arizona State University that she felt would provide valuable input. Professor Church, in turn, requested and received from deans a listing of faculty members who the deans would least wish to lose to some other university. I asked Professor John Wood (EEC Task Force Staff Member and NAU faculty member) to suggest names of persons at Northern Arizona University I should interview. Professor Wood provided a listing of highly regarded faculty members, some of whom were newly recruited to Northern Arizona University.

The notes recorded during the interviews were organized into five dominant themes that influence recruitment and retention: quality of life, character of the intellectual environment, support for teaching and research, salaries and the rewards system, and academic leadership. These themes form the basic structure of the outline of this paper.

I chose not to tape the interviews and thus it was usually impossible to capture, word for word, the language that was used by faculty. Quotations in this paper in some cases are exact, but usually are an approximation to the actual language which was used. However, I have been very careful to preserve as precisely as possible the exact meaning, emphasis, and tone of what was said and how it was said. The use of quotations, even under such circumstances, is desirable, I believe, in order to clearly identify the interview data within the body of this report.

QUALITY OF LIFE

Sunshine, open space, the mountains, clear night skies, desert vegetation, the climate, and the Southwest setting represent striking attractions to those faculty who have chosen to come here or who have decided to remain here. The beauty of campuses of the three Arizona universities creates an environment that immediately seizes the attraction of prospective faculty. But most are quick to point out, "*...it takes more than sunshine to attract and retain good faculty.*"

Our Southwest geographic setting sometimes works to a disadvantage in attracting and retaining faculty. We are removed from the dense cluster of outstanding universities, both public and private, in California and along the East coast. The three Arizona universities are isolated by comparison, and we are removed from the advantages afforded by cooperative cross-town relationships with prestigious institutions.

The steady increase in population and the apparently favorable economic environment instil in prospective faculty a confidence that Arizona's chances for a consistently healthy economy are relatively strong. Most faculty see this as a positive economic forecast for higher education in Arizona. Arizona State University, as described by a recently recruited department head, is uniquely advantaged by its setting. "*It is the only university in a city of two million people, which is an unchallenged academic position that exists nowhere else in the nation. Elsewhere, either the university does not lie in a population center, or if it does, there is incredible competition from other universities and colleges. In addition, economic development in the greater Phoenix metropolitan area is rather sophisticated in relation to population size.*"

The University of Arizona is felt by many to enjoy a tight bond with the Tucson community. The university is unusually prominent in the life of the city, and there appears to be notable community pride in the university. This is felt by faculty members, and is a draw in retention.

The outdoor recreational activities that are presented by the setting of Flagstaff, and the aesthetics of the natural environment of the San Francisco Peaks and the Colorado Plateau country, are especially attractive to many of the faculty at Northern Arizona University.

The quality of 'K through 12' public education in the state is viewed as a drawback, not only in attracting and retaining university personnel, including faculty, but also in attracting industry. Arizona is nearly at the bottom of all states in the dollars per student that are invested in K through 12 public education. Some believe that the universities, motivated by enlightened self-interest, should develop a partnership with 'K-12.' "What will happen to the pool of quality students if the character and quality of elementary and secondary education continue to decline?" "As proportionately fewer students fail to complete high school, will funds be drained away from universities in order to support increased demands on social services resulting from unemployment?" At a recent sixth grade promotion ceremony at an elementary school in Arizona, the principal said to parents and students that all of this will be considered successful if one of the 60 sixth graders graduates from college. We are expecting too little and getting it!

CHARACTER OF THE INTELLECTUAL ENVIRONMENT

The overall atmosphere of the academic environment of a campus can strikingly influence whether a faculty candidate will choose to accept an offer to come, and whether an established scholar, lured by outside offers, will choose to stay.

Faculty at the University of Arizona consistently cited the presence of an exceptionally strong core faculty as one of the most significant assets that UofA possesses in attracting and retaining good faculty. A "serious, can-do attitude" on campus is a strength reported by faculty at UofA. It is commonly observed by prospective faculty members who visit the campus. A critical mass of fine scholars has been assembled, and this has created significant leverage in ongoing recruitment and retention.

A substantial interdisciplinary thrust is also considered by University of Arizona faculty as a valuable asset. There is excellent cooperation among many departments and colleges. As one person put it, "this is the most collegial place I know for interdisciplinary, interdepartmental activities."

Some faculty at Northern Arizona University do not generally feel that a critical mass of scholars has yet been attracted. On-campus collaboration with other scholars is important to faculty, and prospective NAU faculty members sometimes worry about who they will work with. Intellectual, cooperative linkages with ASU and UofA may be increasingly important to break down some of the isolation that certain NAU faculty presently feel.

Close interaction with students, and the presence of faculty who are really interested in working closely with students, importantly shape the intellectual environment at Northern Arizona University. Although some faculty wish the academic reputation of NAU were better, and that the students were better, the overall sense is that the intellectual environment of faculty/student interaction is very close and very supportive.

Trying to achieve the right balance of teaching and scholarship, for a given faculty member, for a given department, and for the university as a whole, is an issue at Northern Arizona University, and it affects the intellectual environment. Where the teaching load is heavy (4 courses a semester), "there is no time to be scholars, thinkers, or readers, ...to be students yourselves." Where there are few upper division courses to teach, faculty feel that they cannot keep up with their scholarship and they find themselves carrying out a service role at the lower division level. This is not intellectually very satisfying, and it can undercut the market value of faculty and can thus impose, much too early, career limits on these scholars. On the other hand faculty at NAU who are more consistently given reduced teaching loads and with it the opportunity to publish and carry out a lot of research are sometimes resented. "You seem to be doing your thing...what are you doing for the department?" "Sharp scholars enter a program where everyone does their 12 hours of teaching each semester, and they are dragged down to the level of the 12 hours/semester people who are not publishing."

At Arizona State University and at University of Arizona, the intellectual environment is also affected by the cultural environment in which teaching is carried out and rewarded. One faculty member at ASU believes that the intellectual environment is corroded by the advertizing of courses through newspaper adds or booths on the mall. The large numbers of students, and the emphasis on numbers of students, gets in the way of things. This reduces institutional self confidence in overall academic reputation when comparisons are made, for example, to other PAC-10 schools.

At The University of Arizona, there are stresses that result from teaching not being rewarded sufficiently. "There has not been a history of systematically rewarding teaching. Not everyone has to teach undergraduates, or teach undergraduates well, but someone must and someone must be rewarded. There are no built-in incentives when facilities are lousy, when there are no budgets for Xeroxing or for preparing slides." "We all have areas of comparative advantage. There are some faculty whose contact with students you would want to minimize; others for which you would want to maximize. There should not be uniform rewards criteria from program to program. Everyone is now evaluated rigidly on the basis of a common criterion - research." This, as observed by one, is not just an administrative problem, ...there is a whole culture of values and attitudes shared by most faculty. This frustration held by some with large "service" loads in teaching basic undergraduate courses creates strains that damage the intellectual environment.

The presence of interested, quality students enormously impacts the intellectual environment of any campus. At each of the three universities many faculty emphasized the need to raise standards of admission and to raise performance expectations. In the words of an ASU faculty member, "lax admission standards followed by lax expectations is a bad combination."

SUPPORT FOR TEACHING AND RESEARCH

Having an excellent library is of utmost importance to faculty on each of the three campuses. The libraries at Arizona State University and The University of Arizona are considered by faculty to be excellent, although there are grave concerns that the number of new journals, the rising costs of journals (especially foreign journals), and fragile funding will combine in ways to harm these libraries.

Faculty at Northern Arizona University generally believe that their library is inadequate. Some would argue that the library simply has not received the high priority in funding it deserves.

"The library (at NAU) will, once more, not receive the funding it needs. It is not designed for 13,000 students. At exam time it is impossible."

"It is demoralizing that sports and sports facilities are given preference over academic necessities. A multipurpose facility will be built, but not a library."

Faculty in science and engineering at University of Arizona and Arizona State University emphasize that capital equipment needs for teaching, research, and performance are not being met by the present combination of state funding, grant support, and foundation/gift support. Yet, resources for research equipment are absolutely essential to recruitment. Presently the availability of start-up money for laboratory equipment is a significant limiting factor in recruitment. Bright prospective faculty who are laboratory oriented understand the need for a firm commitment to their equipment needs. Their quest for tenure and promotion depends upon it.

According to faculty at each of the three universities, travel funds appear to be in short supply. Availability of a satisfactory level of travel funds would enhance recruitment and retention of assistant professors, who recognize the need to gain recognition through presenting papers at professional meetings.

Department heads and faculty worry that new space is not being made available at a pace consistent with mission-driven programmatic plans and goals. At the University of Arizona and Arizona State University *"the management of space is marked by too many delays and lags."*

At UofA, there are problems in both quality and amount of space.

"Remodeling of space is very expensive and very slow."

"The classrooms in which the teaching is done should offer spaces and furnishings that invite students. Yet facilities are horrendous -- why is it so hard to bring about change? We really do need chalk!"

"Classrooms aren't clean; some have terrible acoustics. More money is needed to back-up teaching support."

At ASU as well, remodeling is slow and expensive.

"Can't deliver on remodeling. Promises can't be kept."

Some department heads at UofA expressed concerns about the ability of the institution to deliver space according to the calendar promised. If laboratory space is committed as part of the recruitment "package", but remodeling is delayed, then the faculty member's research program gets off to a late start. A late start heaps added pressure on faculty members who already understand that earning promotion and tenure is difficult under the best of circumstances. *"Renovation is a difficult, frustrating problem."*

Faculty at Arizona State University and University of Arizona believe that the availability of more technical staff support would enhance recruitment and retention. Staff support and the quality of staff are very important to faculty, yet the present number of support personnel, especially in the sciences and engineering, is considered to be limiting. Technical staff can create a time savings, and *"time is the most important resource that a faculty member possesses."*

A number of faculty at the University of Arizona believe that administrative support for faculty at the University of Arizona is seriously hampered by the staff system. *"The only way someone* *can get a better job and salary is to successfully compete for another position on campus, ...or to go through the reclassification nightmare."*

"Private schools have flexibility -- they have learned that competence and excellence are what is to be evaluated." "There is no place on our staff evaluation form that states that the employee is doing the job he/she was hired to do and is doing it excellently."

Research faculty at The University of Arizona applaud and depend upon the return of overhead back to the departments where the money was generated. Overhead return policy at Arizona State University is viewed by research faculty as a disincentive.

Organizational and bureaucratic factors shape the quality of the support. At the University of Arizona, faculty believe that the paperwork *"is completely out of hand and should be looked at in detail."*

"Someone should look at all the forms, every piece of paper."

"It's the worst of six universities I've been associated with." What affects retention is the general cumbersomeness of the whole administrative system.

"Faculty who come here are often used to a greater degree of flexibility, and less hassle, when dealing with personnel, purchasing, and planning services. Headaches are legion. Compared with other institutions we are molasses in winter, whether purchase order, affirmative action, reclassification...There is no such thing as priority action. Marking something "urgent" can be counterproductive."

"The mind set of administrative service support has not changed from the provincial approaches of the 50s. We are not responsive to vigorous, competitive, urgent activities of a front line research university. We need flexibility and prompt, enthusiastic action. In tough budget times, the cutbacks that take place on the physical plant side don't take into account fundamental differences in service needs. Emptying the waste baskets once a week may work ok in history, but not in biology where there is stuff rotting and smelling."

Says another UofA faculty member, *"Responsibility and authority must go together. Decision making on some funding and budgeting items is not being made at the appropriate level. Sometimes 'small change' decisions are being made at terribly high levels."*

At Arizona State University there are similar complaints. *"My renovation related to a big grant bounced around for four years...confusion as to who is responsible for what...eventually much of the money had to go to another university that could respond more effectively, and I go there to do the work."* *Faculty at ASU believe that there are "pretty heavy"* constraints on purchasing.

"When a principal investigator spends four weeks getting all the information together, including comparative costs, why should purchasing have to come along and re-do it all?"

The hiring and retaining of good staff also is a problem at ASU. *"Forcing job descriptions to follow codified classifications creates re-writing of actual descriptions of what the persons will be doing."*

At all three universities there is a sense that bureaucratic hindrances are born of abdication of administration to make decisions. *"Too much reliance on statistics and forms, in order to cover your* ___*"* (UofA faculty member). *"More and more committees! Individuals are not prepared to make decisions. The result is ossification"* (ASU faculty member). *"It is the anonymity of the decision making that is so annoying. It is so frustrating when you never hear any feedback after filling out forms."*

"Good faculty are getting eaten up by a plethora of committees."

"Faculty who serve on committees do not know if their recommendations are being taken seriously; there is no feedback." (NAU faculty members).

SALARIES AND THE REWARDS SYSTEM

AAUP data show that for 1988 the three Arizona Universities are at about the average level when compared with institutions across the country in comparable categories (see Figures 1-6). The average salary for Professors at Arizona State University ($51,200) is the same as the average for Professors at all of the nation's Doctoral Institutions ($51,100)(Figure 1).

Key to Figures 1-4

S - Stanford
B - University of California, Berkeley
UCLA - University of California, Los Angeles
USC - University of Southern California
SD - University of California, San Diego
UT - University of Texas at Austin
UH - University of Hawaii
UA - University of Arizona
ASU - Arizona State University
UW - University of Washington
UC - University of Colorado
N - University of Nevada, Las Vegas
U - University of Utah
W - University of Wyoming
OSU - Oregon State University
WSU - Washington State University
O - University of Oregon
CSU - Colorado State University
NM - University of New Mexico
I - University of Idaho
M - University of Montana
AVG - Average Salary, doctoral institutions, nationwide

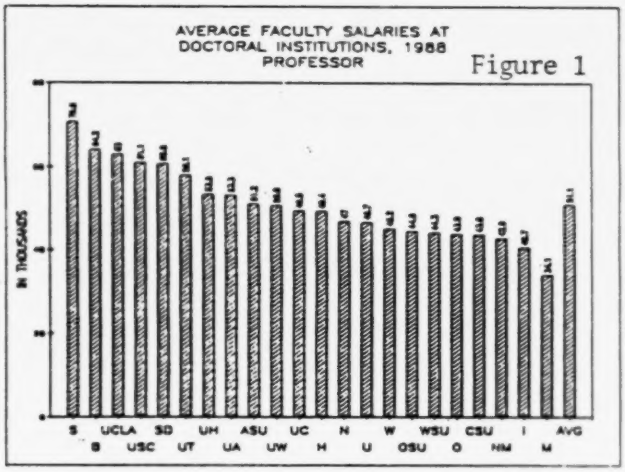
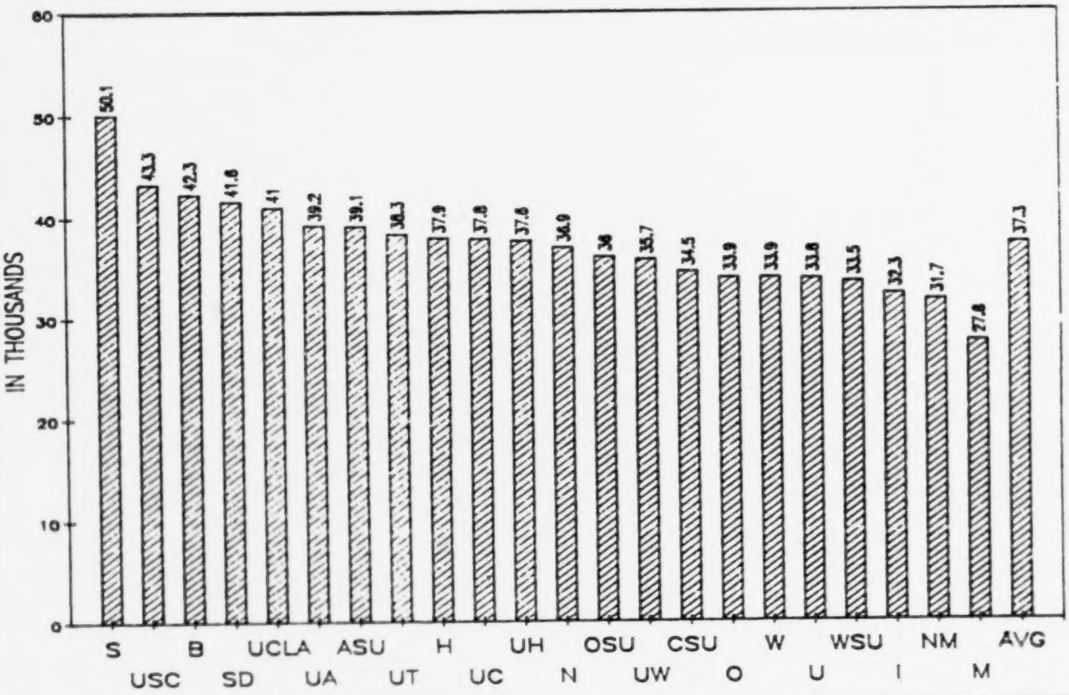


Figure 1

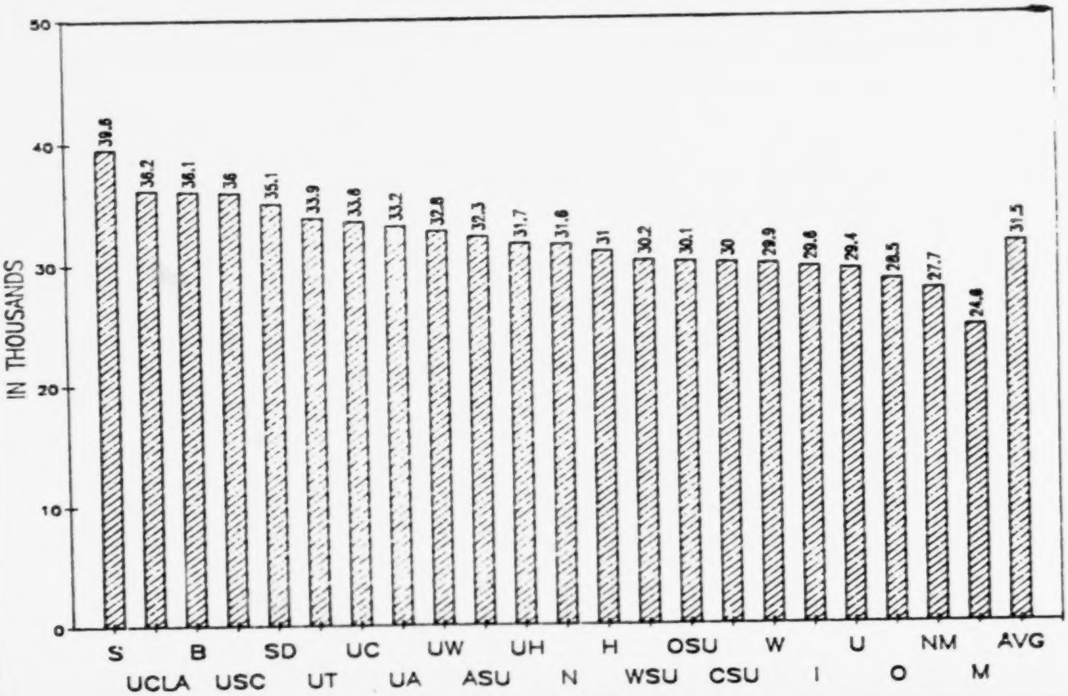
AVERAGE FACULTY SALARIES AT
DOCTORAL INSTITUTIONS, 1988
ASSOCIATE PROFESSOR

FIGURE 2



AVERAGE FACULTY SALARIES AT
DOCTORAL INSTITUTIONS, 1988
ASSISTANT PROFESSOR

FIGURE 3



The average salaries for Associate Professors ($39,100) and Assistant Professors ($32,300) at Arizona State University are slightly above the national averages for Associate Professors ($37,300) and Assistant Professors ($31,500) at Doctoral Institutions across the nation (Figures 2 and 3).

For the University of Arizona, the average salaries for Professor ($53,300), Associate Professors ($39,200), and Assistant Professors ($33,200) are slightly above the national averages for these same categories at Doctoral Institutions across the nation ($51,100, $37,300, and $31,500, respectively (Figures 1,2 and 3).For Northern Arizona University, the average salary for Professors ($46,500) is slightly below the national average ($47,100) for all Comprehensive Universities (Figure 4). Salaries for Associate Professors ($37,200) and Assistant Professors ($30,200) at Northern Arizona University are ahead of the national average for Comprehensive Universities ($34,700 and $28,400, respectively) (Figures 5 and 6).

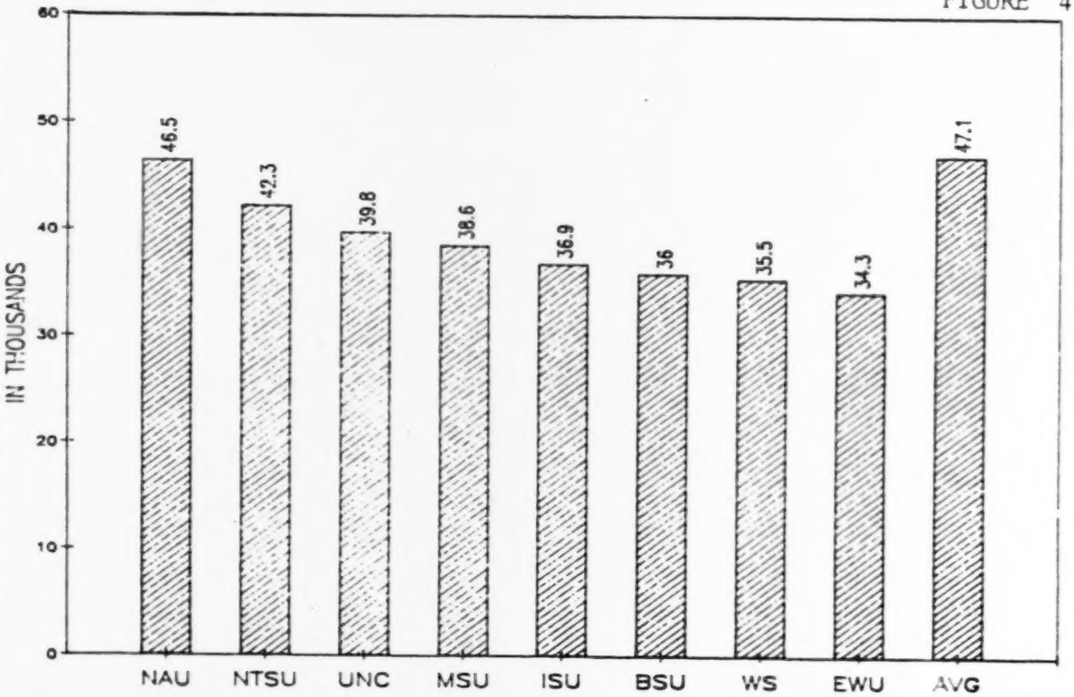
Salary comparisons with schools in the West in the PAC 10, WAC, and Big Sky show that salaries at The University of Arizona and Arizona State University are in the middle range of the universities with which they compare in the West (i.e., Doctoral Institutions) (Figures 1-3).

Key to Fig. 5&6

NAU - Northern Arizona University
NTSU - North Texas State University
UNC - University of Northern Colorado
MSU - Montana State University
ISU - Idaho State University
BSU - Boise State University
WS - Weber State University
EWU - East Washington University

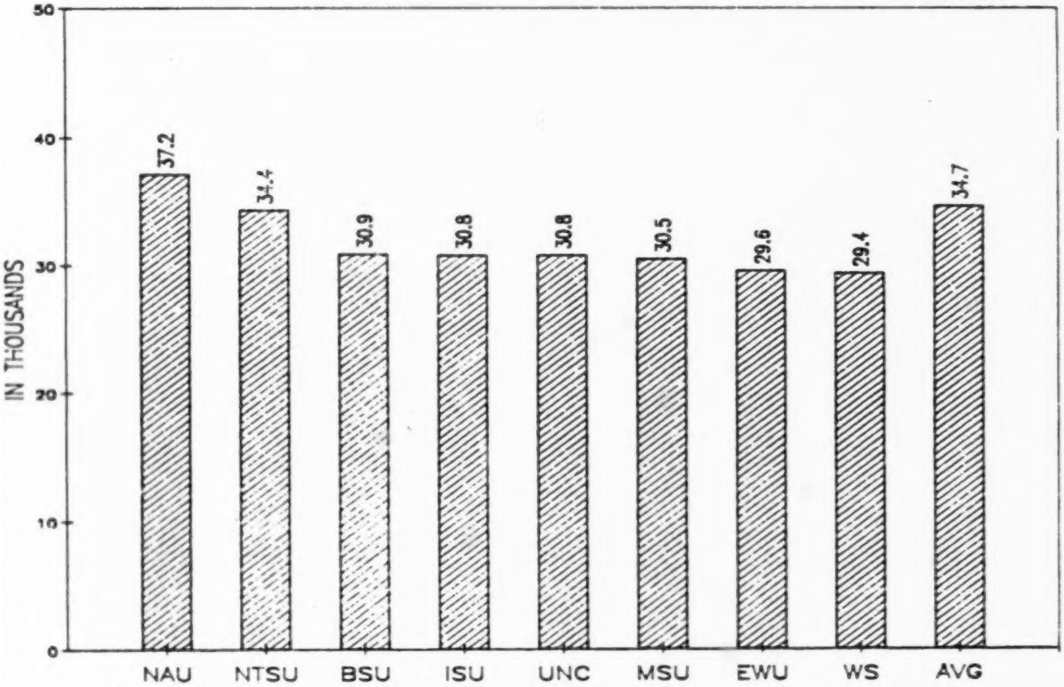
AVERAGE FACULTY SALARIES AT
COMPREHENSIVE INSTITUTIONS, 1988
PROFESSOR

FIGURE 4



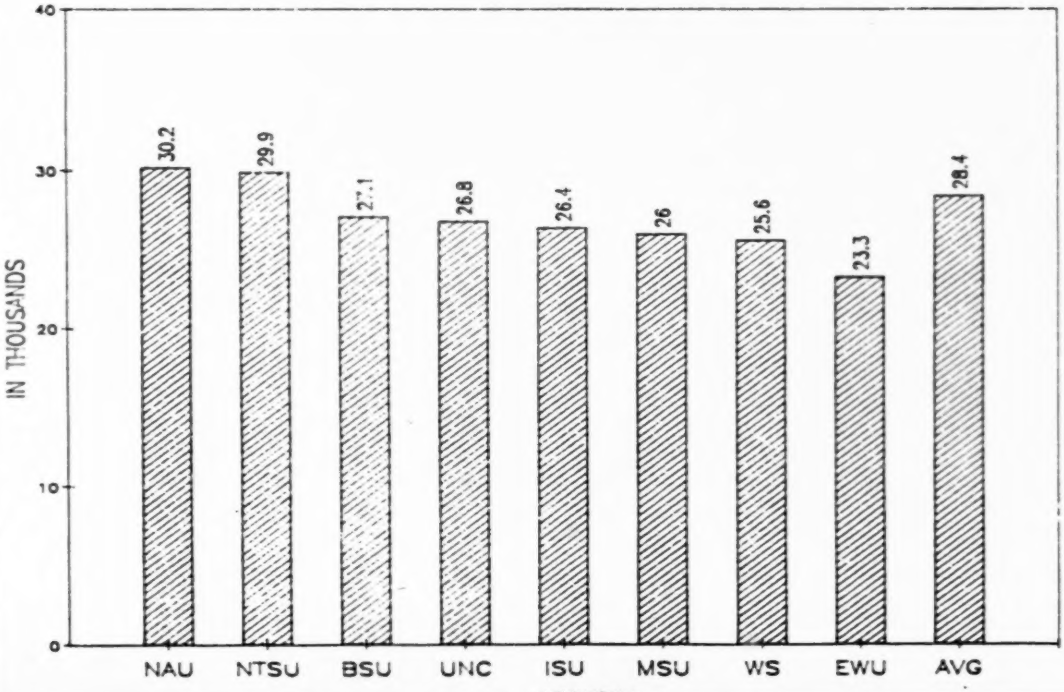
AVERAGE FACULTY SALARIES AT COMPREHENSIVE INSTITUTIONS, 1988
ASSOCIATE PROFESSOR

FIGURE 5



AVERAGE FACULTY SALARIES AT COMPREHENSIVE INSTITUTIONS, 1988
ASSISTANT PROFESSOR

FIGURE 6



On the other hand, salaries at Northern Arizona University exceed those of the universities with which they compare in the West (i.e., Comprehensive Universities) (Figures 4-6).

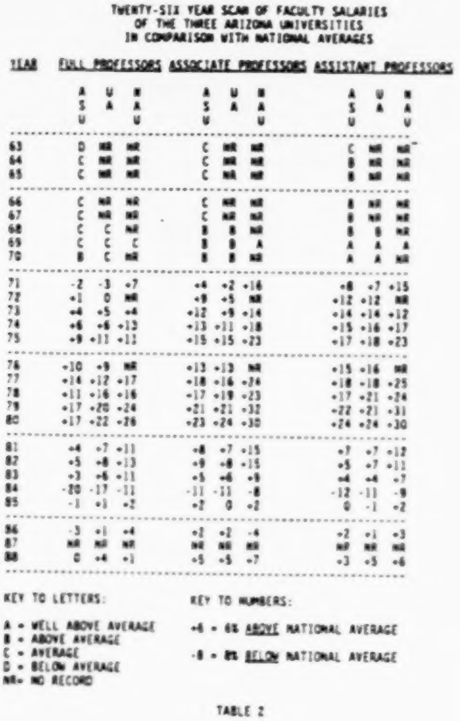
The 1988 salary data give the impression that the Arizona universities are competitive: Arizona State University and the University of Arizona are at or slightly above the national average for the category "Doctoral Institutions;" salaries of assistant professors and associate professors at Northern Arizona University are ahead of the national average for the category "Comprehensive Universities," but professor salaries are slightly behind. However, when salary data for the past eighteen years are examined, the trends are not very encouraging.

Salary data for the three Arizona Universities were compared with national averages for the period 1971 - 1988.

The comparisons take into consideration professorial rank and category of institution. Source of data was the American Association of University Professors.

The data are shown in Figure 7, and they invite a number of observations:

1) During the period 1971 to 1980, average salaries for Arizona university faculty advanced to levels well above the national averages. For example, average faculty salaries in 1980 were 20% to 30% above national averages, taking into consideration professorial rank and category of institution (see Figure 7).



TWENTY-SIX YEAR SCAN OF FACULTY SALARIES
OF THE THREE ARIZONA UNIVERSITIES
IN COMPARISON WITH NATIONAL AVERAGES

YEAR	FULL PROFESSORS			ASSOCIATE PROFESSORS			ASSISTANT PROFESSORS		
	ASU	UA	NAU	ASU	UA	NAU	ASU	UA	NAU
63	D	NR	NR	C	NR	NR	C	NR	NR
64	C	NR	NR	C	NR	NR	B	NR	NR
65	C	NR	NR	C	NR	NR	B	NR	NR
66	C	NR	NR	C	NR	NR	B	NR	NR
67	C	NR	NR	C	NR	NR	B	NR	NR
68	C	C	NR	B	B	NR	B	B	NR
69	C	C	C	B	B	A	A	A	A
70	B	C	NR	B	B	NR	A	A	NR
71	-2	-3	+7	+4	+2	+16	+8	+7	+15
72	+1	0	NR	+9	+5	NR	+12	+12	NR
73	+4	+5	+4	+12	+9	+14	+14	+14	+12
74	+6	+6	+13	+13	+11	+18	+15	+16	+17
75	+9	+11	+11	+15	+15	+23	+17	+18	+23
76	+10	+9	NR	+13	+13	NR	+15	+16	NR
77	+14	+12	+17	+18	+16	+24	+18	+18	+25
78	+11	+16	+16	+17	+19	+23	+17	+21	+24
79	+17	+20	+24	+21	+21	+32	+22	+21	+31
80	+17	+22	+26	+23	+24	+30	+24	+24	+30
81	+4	+7	+11	+8	+7	+15	+7	+7	+12
82	+5	+8	+13	+9	+8	+15	+5	+7	+11
83	+3	+6	+11	+5	+6	+9	+4	+4	+7
84	-20	-17	-11	-11	-11	-8	-12	-11	-9
85	-1	+1	+2	+2	0	+2	0	-1	+2
86	-3	+1	+4	+2	+2	-4	+2	+1	+3
87	NR	NR	NR	NR	NR	NR	NR	NR	NR
88	0	+4	+1	+5	+5	+7	+3	+5	+6

KEY TO LETTERS:

A = WELL ABOVE AVERAGE
B = ABOVE AVERAGE
C = AVERAGE
D = BELOW AVERAGE
NR= NO RECORD

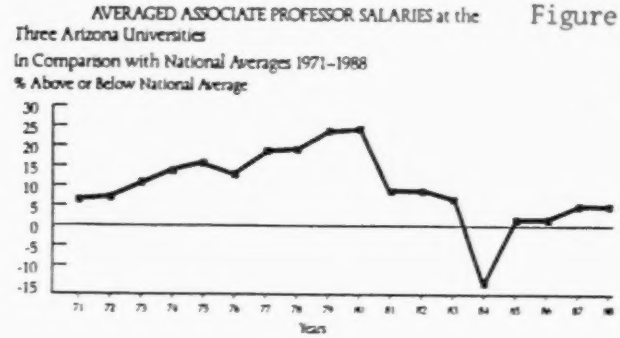
KEY TO NUMBERS:

+6 = 6% ABOVE NATIONAL AVERAGE

-8 = 8% BELOW NATIONAL AVERAGE

TABLE 2

Figure 7



AVERAGED ASSOCIATE PROFESSOR SALARIES at the Three Arizona Universities
In Comparison with National Averages 1971-1988
% Above or Below National Average

Average salaries for assistant and associate professors at Arizona universities remained more competitive than average salaries for full professors.

2) During the period 1981 to 1988, average salaries for Arizona university faculty suffered significant decline in comparison to national averages. For example, in 1984 the salaries of Arizona faculty, regardless of school or rank, were 10% to 20% below national average.

   In 1985, average salaries for Arizona faculty were about the same as the national average. The budget cuts and the breakdowns of the annual salary adjustment cycles clearly took their toll on Arizona university salary competitiveness.

3) The average salary levels for Northern Arizona University faculty, regardless of rank, are much more competitive with national averages for Comprehensive Universities than are salaries for Arizona State University and University of Arizona faculty with respect to averages for Doctoral Institutions. For example, in 1980 the average salary for assistant professors at NAU was 30% higher than the national average for Comprehensive Universities, whereas the average salary for assistant professors at ASU and UofA was 24% higher than the national average for Doctoral Institutions. In 1984, the average salary for full professors at NAU was 11% lower than the national average for Comprehensive Institutions, whereas the average salaries for full professors at ASU and UofA were 20% and 17% lower, respectively, than the national average for Doctoral Institutions (see Figure 7).

The eighteen year scan makes it clear that salaries for Arizona university faculty in the 1980s have not been nearly as competitive, nationally, as they were in the 1970s. We have fallen behind. The radical fluctuations that have distinguished the comparative salary data for Arizona universities in the 80s account for the low level of confidence currently held by department heads and faculty that we can "remain" competitive, nationally. *"The stability of funding is critical. If you constantly are evaluating your faculty, and constantly asking departments to state their objectives and goals and mission needs, but there is never a payoff... this becomes discouraging!"*

"Faculty salaries are competitive when we bring them in...but what about the next couple of years?"

"If we have well above average faculty, their salaries should not be at the median."

There appears to be an urgent need to bring about stability: to define how competitive we wish to be, and strive to maintain our position through appropriate allocation of resources. Difficult questions need to be addressed, such as:

Should the competitive salary position for ASU, UA, and NAU be the same?

When they are not the same, what is the expectation?, what is the justification?

Is it acceptable that the competitive salary position for full professors should lag behind the competitive salary positions for assistant professors and associate professors?

There are other issues that relate not so much to salary, but to the rewards system in general. At Arizona State University there were strongly expressed views among those interviewed that the distribution of awards and rewards is much too egalitarian. *"Resources are taken away from those who are producing. Excellence is not rewarded as much as it could be. This issue could someday cause me to leave ASU."*

Another ASU faculty member put it this way: *"There is always a trade-off that brings everything down to the lowest common denominator. If you have won a national award or a university award, you are precluded from consideration for departmental awards. If your salary is high, you are denied a summer salary grant."*

"A crystal clear signal needs to be sent that excellence will be recognized. There should not be a vested interest in mediocrity. The transition from mediocrity to excellence is made more difficult because of a socialistic system of rewards."

At Northern Arizona University, one of the biggest morale problems has to do with release time, course loads, ...who gets what?

"How can flexibility be achieved without a sense of unfairness?"

"What do you have to do to get a reduced load?"

"There is ambiguity regarding what our mission is. We know that our mission is changing, and we know that it is moving toward more research accountability. But we're not exactly sure what the expectations are?"

ACADEMIC LEADERSHIP

Faculty within each of the three Arizona universities have underscored the importance of leadership, at all levels, in recruitment and retention. The leadership of a university may or may not provide a shared vision within which planning, budgets, and rewards are clearly tied. The culture or atmosphere thus created within the campus environment may be positive, negative, or neutral with respect to recruitment and retention. The leadership establishes organization and policy that either exacerbates or reduces the normally expected frustrations of bureaucracy. Finally, in a very practical sense, the leadership has the major influence in making in-roads into the successful recruitment and retention of minority faculty and women. The same issues, concerns, and points of emphasis emerged on each of the three campuses.

Recruitment and retention are being harmed by insufficient planning, and/or inability to implement plans according to reasonable timetable because of chronic budget instability. Planning carried out at the operational levels of Academic Vice President, Deans, and Department Heads is severely restricted by budget instability from year to year.

"We are planning and beginning to steer a course, but we need to know what we can count on and over what time table."

"Instability of funding may lead to filling lines with individuals who are not the top choices."

"At the university level we lack a tight relation between objectives, goals,

budget, and salary adjustments."

"We need a plan for growth. Right now we're experiencing unplanned incremental growth."

"We need a meaningful master plan for higher education."

"Which programs has the leadership targeted? How fast does leadership wish to build? Such planning does not exist here to the extent that it should, and this demeans the organization."

"Success in recruitment requires knowing what it is that you wish to achieve."

"To get good people, we must plan very carefully, we must be willing to pay for it, we need to determine who we want to try to retain, and we must anticipate who may be picked off."

Many department heads are eager to move toward higher goals, and would welcome authority to match responsibility. *"People ought to be given the trust and responsibility to manage, presidents included. Downshift the management responsibility."*

Are the goals set high enough?

"Central administration is not perceived as setting lofty, substantial goals."

"Image and profile of the university should be defined beyond the national scope. International programs should be emphasized, but there must be incentives."

"Too often there is an unimaginative, administrative approach, a business mind-set."

"This college works on one, two, three orders of magnitude too small. The margin is very small, and we can't afford to piddle it away."

"Vision is absolutely critical. Where do we want to be? How do we want to be perceived? Put a future out there that is visible -- people will strive to attain it. Create a reward structure that is consistent with the vision."

Some would argue that the leadership needs to be more vigilant in it hiring decisions, and in its promotion and tenure decisions. *"Standards of hiring must be enforced. Thirty-year [tenure] mistakes are just killing us. How do you get through the wimp factor? What guidelines exist for search requirements? Some structural changes would help, including mechanisms to enforce higher standards."*

Minority and women faculty look to university leadership as fundamental to successful affirmative action recruitment. *"Affirmative Action Office cannot influence which faculty members are hired." " 'Collegial' -- what does it really mean? To what degree does it promote exclusiveness?" "The power rests with Vice Presidents and Deans, through economic signals." "The President sets the tone and establishes the philosophy. The Academic Vice President must make it happen in an operational way." "There is a lack of sense that the institution is seriously, sincerely interested in and committed to recruiting and retaining minority faculty. There is no clear sense that the culture is respected. We say one thing, but there is not enough follow-through." "Big problem in recruiting and retaining Hispanic faculty members. They are leaving because they are not being supported."* Most minority faculty members are spread thin through heavy committee loads.

Women faculty look to leadership for stronger efforts to improve the status of women on the three campuses. *"An active group of university women is absolutely critical to recruitment. Forms a viable support group and community outside the department." "There are too few top level women in administration. The number of full professors that are women can be counted on one hand. Total male establishment sends signals that opportunities are limited."*

Mechanics of recruitment are sometimes disadvantageous to women. For example, there is a perception that the university does more to find jobs for spouses of male faculty, than for spouses of women faculty. Certain ways in which interviews are conducted are disadvantageous to women -- e.g., in hotel rooms at professional meetings. Sexist jokes have by no means been eliminated. Such "jokes" put women on the defensive. *"Consciousness needs to be raised."* Recruitment of women should be more deliberate and aggressive -- find out the names of publications that are widely ready by women faculty; arrange Vice-Presidential level interviews for all women faculty candidates who visit the campus, regardless of proposed professorial rank.

Policies should be developed for the recruitment and employment of couples seeking university positions. Can objective promotion and tenure evaluations be carried out when the assistant professor under review is the spouse of the department head or dean? How is this handled?

Significant advantages in recruitment and retention of faculty women could be derived if child care facilities were conveniently available and affordable.

Developing policies and benefits that serve women faculty who chose to bear children during their probation years are needed.

"The kiss of death is telling your department head, in your 4th or 5th year of probation as assistant professor, that you are pregnant. No longer will you be regarded as a serious scholar."

RECOMMENDATIONS

- To maintain our strengths and reduce those factors that interfere with successful recruitment and retention, we recommend the following:

1) Universities and ABOR should seek ways to increase the level of technical staff and capital equipment support.

2) Universities should review classroom/laboratory remodeling procedures and practices, and modify the approach in ways that will be faster and cheaper without undercutting quality.

3) Universities and ABOR should seek ways to accelerate the schedule of new building construction.

4) Universities, ABOR, and Board Staff should engage in a war on paperwork and committee proliferation, at all levels, through elevated consciousness of the value of people's time.

5) The Board and the leadership of the state government should agree on goals with respect to the competitiveness of faculty salaries and seek to attain them.

6) Universities should bring more commitment and resources to bear on the recruitment and retention of women and minority faculty.

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